



AGRICULTURAL RESEARCH INSTITUTE

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INDEX.

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NOTES.

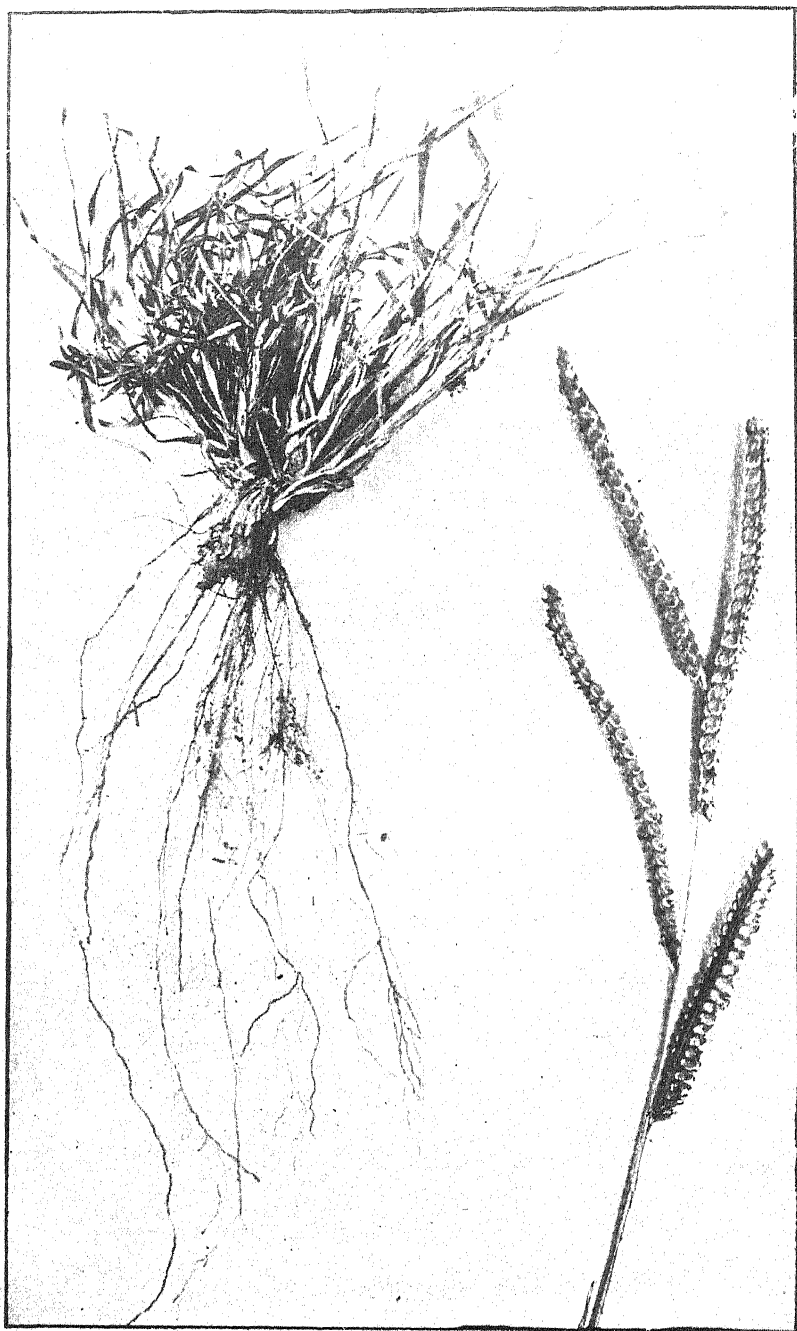
BULL FOR SALE.—A correspondent writes to say that he has a good Jersey bull for sale; he is five years old and is in prime condition, he has taken three first prizes. Particulars may be obtained on application to the Secretary Department of Agriculture.

CONGRATULATIONS FROM NEW ZEALAND.—Mr. D. J. Willis, writing from Rangitikei, New Zealand, congratulates the Department of Agriculture on the excellence of its monthly JOURNAL. Dealing with an article on drainage, by P. Wicken in the April number, Mr. Willis asks "why is it not possible to convince people that by spending £30 they can ensure the return of £100? Curious, but it is a fact." The principal lands in New Zealand for pastoral purposes are reclaimed swamp country.

SAN JOSE SCALE.—In connection with the *Gazette* notice quarantining Mr. J. Hawter's nursery at Smith's Mill on account of an outbreak of San José Scale, the Department of Agriculture desire to point out that the infected trees were at once burnt, and that Mr. Hawter has taken every measure to stamp out the pest. Any trees or plants before leaving the nursery are fumigated, examined and passed by an Inspector of the Department, and no risk is attached to growers obtaining their supplies from this source.

ENQUIRY COLUMN.—It having been suggested by a correspondent that an enquiry column established in connection with the JOURNAL would be of considerable benefit to subscribers, the Editor of the JOURNAL will be pleased to reserve a page for the purpose of answering questions of public interest on agronomic matters. All enquiries should be addressed to the Editor of the JOURNAL, Department of Agriculture, Perth, and should be accompanied by the name and address of the enquirer—not necessarily for publication. All enquiries of sufficient public interest will be answered on this page by the officers of the Department.

AN AFRICAN RUBBER PLANT.—Recently the Department of Agriculture received a parcel of seed of a new rubber tree, the *Kichxia Africana*, or the female Ire tree, from Mr. T. W. Brown, Aburi, Gold Coast Colony, West Africa. Dr. Morrison, Government Botanist, states that the *Kichxia* is just coming into prominence as a source of rubber. Reckless destruction of the trees has been going on, threatening their extermination, but steps have been taken to teach the natives less wasteful methods of securing the rubber. The seeds have been forwarded to Messrs. G. F. Berthoud, experimental plots, Drakesbrook; J. W. Durack, Wyndham; and to the manager of the R.C. Mission Station at Beagle Bay. In the letters accompanying the seeds to the North-West, the addressees are asked to name persons willing to carry out experiments with tropical plants for the department.



PASPALUM DILATATUM
Showing Roots and Seed Head.

THE TRIAL SHIPMENT OF GRAIN.—The Department of Agriculture has received a communication from Mr. W. Dinsdale, manager of the Empire Milling Co., York, drawing attention to the fact that certain wheats in the circular issued by the Department are set down as being received from the Empire Milling Co., Beverley, and that this is deemed likely to do the Empire Milling Co. injury by diverting the correspondence to Beverley instead of York, where the only mill of the company is situated. Mr. W. B. Hooper, the chief clerk to the department, states that at the time the wheat was being collected the department was not able to get anyone at Beverley to supply a sample, and the Empire Milling Co., York, kindly undertook to collect exhibits from Beverley and York. It was necessary when sending the wheat to London, to credit each sample to the District from which it was obtained, and at the same time the department wished to acknowledge the courtesy of the Empire Milling Co. by crediting it with the collection—hence the mistake.

REPLIES TO RESOLUTIONS PASSED AT AGRICULTURAL CONFERENCE.—Resolution: "That in the opinion of this conference, the Government should be asked to provide special trains for the conveyance of passengers and stock to and from agricultural shows." The Hon. Minister for Railways replies as follows:—Excursion tickets, at single fare for the return journey are issued in connection with all agricultural shows, and, in cases where the traffic warrants, special passenger trains are also run, the whole arrangements being invariably advertised in good time. Notwithstanding the facilities we afford, a heavy patronage is not afforded us. To quote an instance, on October 10th, in connection with the Northam Show, a special passenger train was run from Perth, and although it was advertised in the metropolitan morning papers from Oct. 6th, to Oct. 10th, only *ten* passengers travelled. The whole of the live stock booked in connection with the show, consisted of three crates of pigs, five horses, thirteen sheep, two head of cattle, and four boxes of fowls.

A NEW CALIFORNIAN RESISTANT GRAPE VINE.—E. D. Sweetser, editor of the *Sonoma County Farmer*, read a very interesting paper last December before the Fruit-Growers' Convention at San Jose, Cal., on "Resistant Vine Stocks." He stated that his purpose was to champion a native Californian stock, which he believed would withstand the deadly phylloxera. The vine is named "Rampendahl Vigorosa" on account of its vigorous growth, and Rampendahl in honor of Professor A. C. Rampendahl, of St. Helena, who, in 1885, found the vine growing wild in a mountain ravine. Climbing some twenty feet into a tree that supported the vine Professor Rampendahl secured seven cuttings from the dense top growth. Mr. Sweetser says that he saw last October a vine growing from one of these cuttings in the midst of a vineyard that had been

infested by the phylloxera for years, and the contrast between the old vineyard and the vigorosa which were planted where the old vines had been removed was remarkable. The late H. W. Crabb of Oakville made a test of the vigorosa in very dry gravelly soil. It is said that the vigorosa shows better growth in the Crabb vineyard than any other of the resistant stocks tested there.

LEMON CURING.—The *Porterville Enterprise* (U.S.A) gives the following description of how C. W. Buswell, a successful lemon grower of that section, cures his lemons. Like one or two Mildura lemon curers, he always picks them carefully in the autumn and does not store away anything colored, only those that are green. The colored ones he ships at once. He next places them in boxes sixteen inches wide, ten deep and twenty-four long. He fills the boxes with these so that the box which is placed on top will not rest on any of the lemons below. No later than the next day he places them in a cellar which is dug in the ground, the size being according to the space required. One top ventilator is all that is necessary and there should be no others to cause a draught with the exception of a door, which should be open at night, when the temperature should not be over 60 degrees Fahrenheit. The cellar should be kept perfectly dry. The boxes should be stacked close together to avoid the circulation of what air there is. The lemons are rarely sorted over, if kept according to above directions.

PRODUCTION OF HONEY.—The Secretary Department of Agriculture has received a letter from Mr. Hugh McNeill, of Waroona, supporting the action taken by him in vacating the chair at the recent beekeepers' conference. Mr. Cowen's action was taken as the majority of the delegates seemed to indicate a desire to keep the number of persons engaged in the work of honey production as low as possible. Mr. McNeill pertinently asks: "Is not the fact that £10,000 has been spent in importing honey during the past four years, and the paltry output in Western Australia of 22 tons, sufficient argument to show that the distribution of literature on the subject would do an enormous amount of good?" Continuing, the writer points out that £10,000 represents an output of 400 tons at £25 per ton, or just as much as forty practical beekeepers could turn out in an ordinary season, even when combined with other farming work. Mr. McNeill declares that beekeeping is one of the most profitable of rural industries, and it deserves all the encouragement the Agricultural Department can give it. As further evidence of his sincerity, Mr. McNeill offers the use of the hives and appliances obtained for the conference, for the use of the department, in instructing beginners in the proper method of commencing operations.

PASPALUM DILATATUM.

BY PERCY G. WICKEN.

2830 This valuable fodder grass is a native of South America, it will grow and flourish in almost all tropical and sub-tropical climates, and has been found growing well at a height of two thousand feet above sea level, it has now been grown in all the Australian colonies, and has proved one of the most valuable fodder plants yet introduced into Australia. It is a perennial grass, and although essentially a summer grass, will yield good picking for stock all through the winter and directly the warm weather sets in, in the spring it starts and grows at a great rate and will maintain a large number of stock during the summer months. This grass was unknown in Australia until a few years ago, when it was first introduced and grown on the Richmond river, in New South Wales, by Mr. A. Seccombe, who was greatly taken with it. It was also grown on the grass plots at the Wollongbar Experimental Farm on the Richmond river, and there proved such a success and stood out so prominently among the other grasses, that a good area was planted out and the seed was distributed among the surrounding farmers, who all took up vigorously the planting out of this grass, and most of the farmers on the Richmond and Clarence rivers say that they owe their success in a measure to the great milk producing qualities of this grass. On my last visit to the Wollongbar Farm, the paddock of *Paspalum Dilatatum* was a picture to look on, although the stud cattle and an imported bull had been kept on it all the spring and during the hottest part of the summer, the grass was perfectly green and over the tops of my boots, and being well cropped by the cattle, presented the appearance of a well watered buffalo grass lawn, such as we see in the suburbs of most of our large cities.

If allowed to grow the grass will run up to a height of 5 ft., and can either be cut for hay or cut and fed to stock. When ripe and the seed has turned to a golden color, it somewhat resembles a wheat field, and looks very well from a distance. Some very good reports are circulated as to what the carrying capacity of a paddock of *Paspalum Dilatatum* grass is, one dairy farmer whose farm is situated next to the Wollongbar Experimental Farm said that he was milking 75 cows, fed solely on 50 acres of *Paspalum Dilatatum*. Some remarkable milk yields are given from this district, one man saying that £1 per month per cow was a general yield during the season, and this with the price of milk at 2½d. per gallon; but this I know, that the dairying industry is in a very flourishing state, and that there are creameries every few miles along the river banks, and some very large factories in the different towns along the river. At Lismore, alone, there are two factories, between them turning out over six tons of butter per day, which alone represents a large amount of money and affords a considerable amount of employment.

Paspalum Dilatatum is a great drought resister, the accompanying illustration gives some idea of the depth the roots penetrate the soil and their power of drawing up moisture from the sub-soil, it resembles lucerne in this respect, and grows during the hot weather quite as fast as lucerne. In carrying out some experiments as to the feeding value of *Paspalum Dilatatum*, I fenced in an eighth of an acre of this grass and turned 38 sheep on to it, they were very fond of the grass, and ate it as well as I have seen them eat anything. They were on it for eight days, and as it was sown in drills and on sandy soil, they ate it right below the surface, and there was not a sign of the grass to be seen, the sheep were removed, a cultivator run between the rows, and in three weeks time we were able to turn the sheep on to the grass again. If kept and cut for hay two or three cuttings may be made during the summer, it is also very valuable for placing into the silo, and for dairy farmers it would be much better to use it for ensilage than to make it into hay. If not kept well cut or eaten down, it is inclined to get tussocky, and is then very awkward to harvest, as a mowing machine will not cut it, and cutting by hand with a scythe or sickle is not a profitable undertaking in these days. *Paspalum Dilatatum* does best on a moist, rich land, but it will do almost anywhere, and I have seen it growing in dry districts when nearly everything else was burned up, although of course, not in such profusion as in the moist coastal districts. It will stand a fair amount of frost, and I have never seen it injured by occasional frosts, but it would not stand a continuous run of frosts and cold weather such as we might experience in some of the higher table lands and mountain ranges.

A considerable amount of difficulty is often experienced in raising this grass from seed, but I am inclined to put this down to two causes, both of which may be avoided, viz., insufficient cultivation of the soil, and immature and badly selected seed. The ground for sowing grass seed requires to be brought to a fine tilth; the seed being small and light requires to be covered very lightly, and if the soil is rough and covered with clods as we often see it, it is impossible for the young seeds to obtain a root-hold, the ground cannot be too finely worked for sowing grass seed, it requires to be harrowed, cross-harrowed, disced and rolled, until a fine level surface is obtained, it is no use to say it is too much trouble, or it will not pay, if it is worth doing at all it is worth doing well, and it is better to run a harrow or roller over the ground a few extra times than to find your labor and seed, etc., all lost, and then to blame the seedsmen or the Agricultural Department or anybody except yourself. If the ground is well worked the seed may be sown broadcast and simply rolled in, if sown in this way it is better to mix the seed with cocksfoot grass seed, as the cocksfoot does well in the winter, and is at its best when the *Paspalum* is at its worst. By this means a good pasture may be obtained, which will carry a great number of stock all the year round.

A large amount of immature seed has been put upon the market, and this has been the cause of so many complaints as to the seed failing to grow. The seed ripens unevenly, part of it being quite yellow and the other part green. The best way to harvest a small quantity is by hand, to go along and pick off all the yellow seed, but if any quantity has to be harvested this method will be found to be too slow and expensive. The best way to harvest a large quantity is to cut down the grass and tie into sheaves and remove into the shed and then shake the sheaves over a floor, the seed that comes off the first and second day will be mostly good plump seed, with very little green seed among it, and will nearly all germinate. After this is done the sheaves may be kept and shaken several times, or put into a heap and thrashed out with a flail, but the seed is only of a second quality and the germinating power is very small. The first quality of seed fetches a good price, and is well worth it as it is troublesome to obtain, the other quality is sold for any price that can be obtained, and is generally the dearest in the end as it often fails to germinate at all.

Some time ago the Department of Agriculture imported a quantity of seed and distributed it among the farmers in this colony, and received numerous complaints that the seed did not germinate, whereas other reports were equally favourable.

Mr. J. B. O'Leary, Brodwarden, Boyanup, writes to his seedsmen as follows:—

“I have much pleasure in stating that the *Paspalum* seed I got from you is doing well; in fact, could not be better, and last week I forwarded a sample of the grass to the Department of Agriculture for exhibition during the Producers' Conference, so that it might be better known throughout Western Australia.”

This shows that some people have been successful with growing it, and if good seed is obtained, and the ground properly worked, there should not be many accounts of failure to grow.

The seed should not be sown until spring, it is better not to sow it until October, as it will not grow until the weather gets really warm, and if sown earlier it allows the weeds to obtain possession of the land before the young grass has a chance to obtain a root hold. Seed sown in the late autumn and winter has been put down as a failure, and ploughed up and sown with maize, and when the maize crop came up the *Paspalum* came up and grew all through the crop.

A very good way to plant out this grass in small areas is by subdivision of the roots, the plant grows to a large clump which may be dug up and the roots divided and planted out again the same as cabbage plants; one clump often gives as many as 200 cuttings, and I have seen accounts of as many as 313 being obtained from one single clump. The largest of the roots should be cut off, and also the long top of the grass, the root placed in the ground, and the earth well pressed round it. A short time ago I planted out an acre this way and did not have a single root miss; the rows should be 3 ft. apart, and the plants 3 ft. apart in the rows, an acre planted

in this way would contain 4,840 plants. The roots may be obtained in N.S.W. at the rate of 10s. per bag, which should contain a thousand to twelve hundred roots, and are largely sold, many people preferring to plant out in this way. A heavier crop for cutting may be obtained by planting in drills, as the cultivator can be kept going between the rows, and the soil kept in a moist condition through all the hot, dry weather.

The following analysis of some hay made from *Paspalum Dilatatum* was made by Mr. F. B. Guthrie, chemist to the Department of Agriculture, N.S.W.:—

Moisture	...	...	10.55
Soluble albumenoids	...	...	1.38
Insoluble albumenoids	...	...	8.93
Digestible fibre	...	...	29.96
Woody fibre	...	...	27.95
Soluble ash	...	...	4.32
Insoluble ash	...	...	2.05
Amide compounds	...	...	14.86
			100.00
Total Nitrogen	...	...	2.66
Nitrogen in amide compounds	...	...	1.01

I subjoin an analysis of hay from meadow grass from English source, which will afford a comparison of the value of these fodders. From this it will be seen that the amounts of total albumenoids and of digestible fibre, which are the chief factors in determining the feeding value of the hay, are very similar with a slight advantage in favor of the *Paspalum* hay. The solubility of the fibre, albumenoids, and mineral matter being, moreover, greater than with the English hay. The most striking peculiarity is, however, the comparatively large amount of nitrogenous matter other than albumenoids. The nitrogen in these combinations is of comparatively no feeding value.

ANALYSIS OF HAY FROM MEADOW GRASS.

Moisture	...	...	14.00
Soluble albumenoids	...	...	.98
Insoluble albumenoids	...	...	7.89
Digestible fibre	...	...	28.68
Woody fibre	...	...	22.92
Soluble ash	...	...	2.20
Insoluble ash	...	...	4.66
Amides, etc.	...	...	18.67
			100.00
Total Nitrogen	...	...	1.54
Nitrogen in amides	...	...	.12

The *Paspalum* hay compares very favorably with ordinary hay, containing a larger proportion of digestible and nourishing material.

If both analyses are calculated to dry substance, it will be found that the *Paspalum* hay shows the higher albumenoid content, the amount of digestible fibre being almost identical.

WEANING PIGS.

By "AGRED"

It is not too much to say that, as a profitable animal, a pig is made or marred during the month that follows its removal from the mother: and whether the intention is to pasture the growing pigs or to feed them rapidly to the porker stage, the treatment immediately after weaning should be similar in both cases. As to the age for weaning, if the piglings are to be sold fresh off the sow, the pig breeder will of course do the the best he can for himself, and if he has a buyer fool enough to take them, at from four to six weeks old, so much the better for the breeder, though the reputation of his stock is not likely to improve; but if he purposes feeding the pigs himself, they should on no account be removed earlier than two full months, and for the last three or four weeks should have been fed on such foods as they will have when weaned. The food for weaners must be, at least moderately rich, and easily digested. To attain this latter end, such foods as meals should be prepared by having boiling water poured on them and allowed to stand until cool. On the question of cooking food for swine, there has waged a long and interesting war between the advocates of opposed systems, and perhaps the carefully conducted experiments at the Maine Experiment Station leave the balance in favor of uncooked foods. But however true the results of these experiments, which for about nine years have given identical conclusions, may be in reference to the feeding of grown swine, it has been the invariable experience of the writer that, for young pigs, cooked food is much the more profitable. Newly weaned pigs are sometimes seen whose dietary is an exclusive one of pollard slop, fed in unlimited quantities twice or thrice daily. Such a system of feeding is seldom, if ever, satisfactory. While with the mother, the young ones were accustomed to receive their nourishment in small quantities, often, and in a highly digestible form, and on these lines, feeding must be continued for some time. To take them suddenly away from the mother, and load them up to the limit of their capacity on raw pollard and cold water, is to put a strain on the delicate digestive organs, too excessive to be borne by ordinary pigs. The consequences are that the young ones scour, much of the food passes undigested, digestive disturbances arise, and in a short while the pigs are practically destroyed as profitable animals.

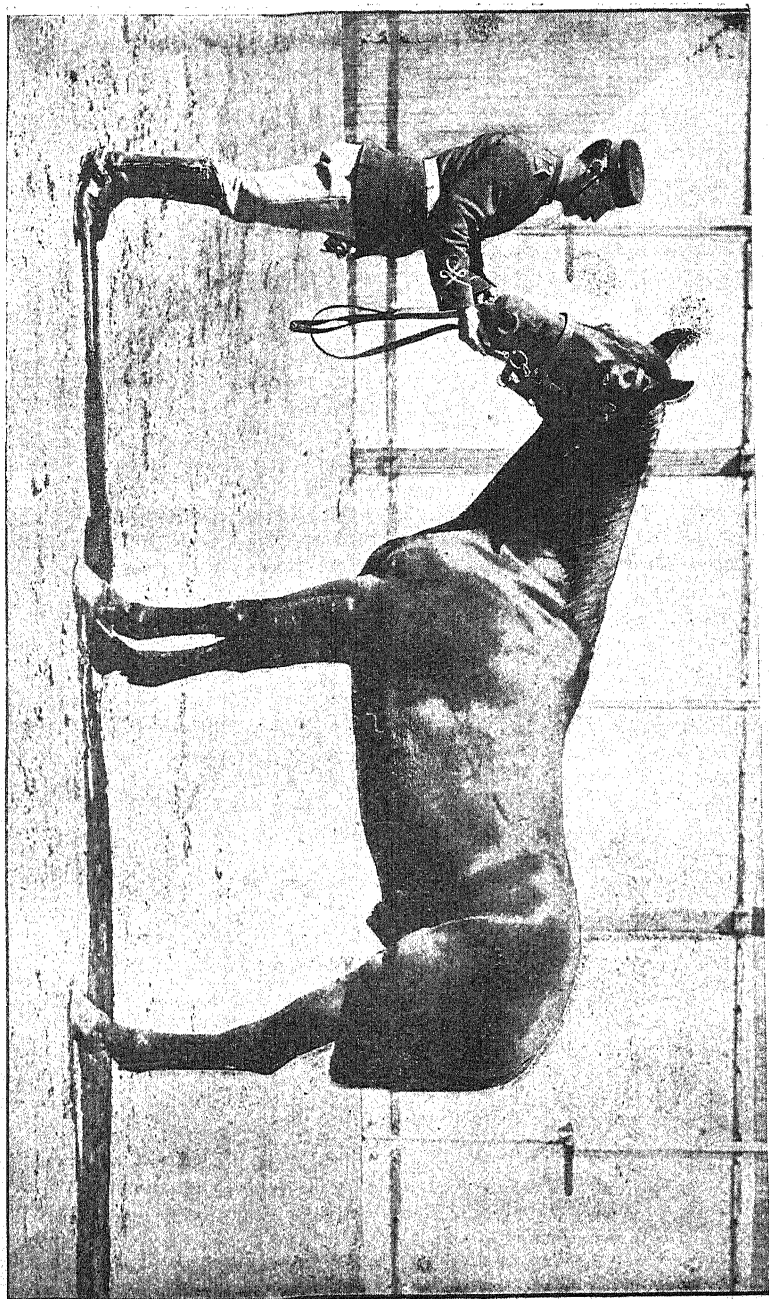
The food for weaners, then, should be rich and easy of assimilation, and it should be fed in medium quantities and at frequent intervals. They should be given considerably less than they will readily clean up at each meal, and for the first fortnight after weaning, they should have five, or still better, six meals each day. The art of growing pigs quickly and well is the art of making them eat well. And the way to make them eat well is to feed little and often: the way to sicken them of their food is to overload their stomachs. In cold weather, the food should be fed warm; in hot

weather moderately cold. It will be found an excellent plan to supply a varied diet, say pollard and peas, or crushed grain and oil cake (peas for preference in summer, oil cake for preference in winter). The pollard or grain should be fed one meal, the peas or cake the next, and so on. Green stuff and roots should be given *ad lib.*, and a supply of charcoal should always be within their reach. After a fortnight of this treatment, the number of meals may be reduced to four, and the quantity increased: and after the next fortnight, the pigs will do all right on three meals daily. If it is intended to continue feeding for porkers, and to feed on raw foods, let the transition from cooked to uncooked foods be accomplished gradually. Sudden changes are to be avoided. If, however, the youngsters are to be put to pasture, they may safely be put out at this stage, but unless the pasturage is unusually good it will probably be found advisable to give them, in the evenings, as much rich food as they will eagerly clean up. It may seem to many that this is an unnecessary amount of trouble to bestow on a pig. The answer is that no trouble is too much which gets the best out of the pigs. One is constantly hearing of pig keepers abandoning their business as it does not pay. This is generally the case with the too-much-trouble people. The properly managed pig is a highly profitable animal; but the improperly treated one is a perfect marvel, it will consume astonishing amounts of food without apparently gaining in any other respect than ugliness.

REPORT OF PROCEEDINGS BEE-KEEPERS CONFERENCE.

The first of what is intended to be annual conferences of bee farmers and those interested in the production of honey and beeswax, was opened in the afternoon of June 13th, in the Museum of the Department of Agriculture. Mr. L. Lindley Cowen, Secretary for the Department of Agriculture, occupied the chair, and the following delegates were present:—Messrs. Pleiffer (Wagin); Kline (Guildford); Tait (Fremantle); J. Shipton (Swan Orphanage); A. Selway (Guildford); S. Bevan (Bridgetown); M. Williams (York); Smith (Chidlow's Wells); H. Layman (Greenbushes); G. N. Allnut (Bridgetown); G. F. Charles (Gallup Brook); G. Andrews (Leederville); W. Masterton (Perth); C. J. Jecke (Guildford); J. Sutton (Drakesbrook); A. Crawford (Guildford).

Proceedings were opened by an address from the Hon. Minister for Lands, Mr. G. Throssell, who, in the course of his remarks, said:—“In New South Wales the output of honey and beeswax for the last seven years was valued at £107,000, whilst Victoria for six years produced similar commodities of a value of £71,000. Turning to Western Australia, in 1896 they had 2,736 hives, which produced 82,255lb. of honey. In 1897 there were 3,150 hives, and the output



LIGHT CAVALRY.

had increased to 94,000lb. In 1898 there was a falling-off, due probably to the drought, and to disease having broken out amongst the bees. The number of hives fell to 2,586, whilst the yield was only 47,487lb. Nevertheless, this would show that the industry was an important one. In the last four years they had sent away £10,000 for honey. This was not an expensive industry. There was no barb wire fencing required, nor was there any fear of trespass by the bees. He believed that one bee farmer had obtained £40 per ton for a yield of 7 tons. This meant nearly 300 sovereigns received for honey alone, and he thought it showed that the industry was not to be despised. He could not claim much experience in honey making, but it struck him whilst travelling through the country that there was a great deal of splendid country being opened up that would be suitable for the purpose. He particularly referred to the ringbarking of redgum trees, and thought if an application were made to the Government, that a few reserves in various parts of the colony could be granted for the purpose of bee culture by providing the best flora, the redgum. One thing they would have to battle against was the ignorance of the people. All admitted the importance of the industry and of educating people in this respect. It would be the duty of Mr. Cowen and the other officers of the department to give every information to bee farmers. He thought also that the department might invest in a full set of bee keeping apparatus, so that the experts could travel through the country and explain to the people the latest improvement in the trade.

The Minister for Public Works (Hon. F. H. Piesse) followed, and said beekeeping should be adopted by all farmers. It cost little, and, if properly conducted, would be found to add appreciably to their income. When on a visit to a farm recently, he learned of the presence of foul brood, and the almost extermination of the bees from the district in consequence. That meant disaster to some of those engaged in the pursuit. Meetings such as that assembled would do much to obviate the difficulty, and he took it that they had met to act in unison for protecting the industry from unfair competition, from the introduction of disease and pests. He thought the delegates need have no fear of the earnestness of the Minister or the department, to do everything in their power to assist the beekeepers. The delegates could also assist themselves and the industry by circulating the latest information, and exchanging ideas on the matter. Speaking of the £10,000 already spent in obtaining honey from the other colonies, Mr. Piesse held that that fact offered special inducement for the beekeepers to go ahead. He trusted that the conference would be but the first of many, and that the industry would progress. He had pleasure in moving a vote of thanks to the Hon. the Minister of Lands for the important and inaugural speech he had delivered in opening the conference. (Applause.)

Mr. C. Harper, M.L.A. (chairman of the advisory board to the Department of Agriculture) seconded the motion.

The Chairman, before putting the motion, said that they intended to have special conferences to deal with fruit growing, bee

keeping, and other industries, whilst the larger conferences would deal mainly with the political aspects. The Department of Agriculture was making arrangements to establish a breeding farm at Rott-nest for queen bees of a disease resisting species. These could be obtained at a minimum cost, and would be a great relief to those who had to import the queens from the other side or elsewhere. It was absurd to send away money for honey, when this colony was better suited than any other colony in Australia for bee growing. One bee keeper objected to the Department of Agriculture interfering, as he and a few others had a monopoly. He wished to say that the Department and its officers were working for the good of the public, and not for that of the individual only. He hoped the delegates would remember this. (Applause.)

The motion having been submitted to the meeting, was carried unanimously.

Mr. Throssell thanked the delegates for their expression of good will, and an adjournment was then made for refreshments.

On resuming, the Chairman explained that the conference was the outcome of a meeting held during the Producers' Conference, when Mr A. Crawford was appointed hon. secretary. It would be advisable, he thought, at first to carry a resolution for the establishment of a Beekeepers' Association.

Mr. Sutton moved—"That a Beekeepers' Association should be formed." He explained that at the previous meeting, held in April, it had been decided by a few beekeepers that the time had arrived when they should take action to defend their interests. He dissented from the views expressed with regard to a general distribution of literature on beekeeping. They wanted to foster the industry and at the same time protect themselves, so that they could get a fair return for their outlay. He was not afraid of competition, but there was a danger of the thing being overdone.

Mr. C. H. Smith, in seconding the motion, spoke in a similar strain. He supposed he was the person mentioned by the chairman as wishing to have a monopoly of the trade. He explained that whilst he thought there should be the utmost facility given to beekeepers for furthering the industry, it was inadvisable to spread literature broadcast, as by that means people thoroughly unsuited for the calling would be induced to waste money in it. He doubted the Minister's authority with regard to the man getting 300 sovs. at 4½d. per lb. for honey. The price was more probably 3½d., and he failed to see what advantage a bee expert, with apparatus, travelling the country would be. He considered the money could be better spent.

Mr. Kline said that the experience in New South Wales was that the only people who benefited by the visits of Government experts were Government officials, school teachers, and others, who thus, in order to add to their salary, come into competition with those who

took up beekeeping as a livelihood. He held that it was inadvisable to teach others than those who had to make their living by the industry.

The Chairman said, before he put the motion he wished to inform them that they could have the use of the museum as often and as long as they liked. But, judging by the remarks of the last three speakers, and as there were no dissentients, evidently the delegates did not wish others to come into the industry, but desired a monopoly. Under the circumstances, he thought that, as Secretary of the Department of Agriculture, it was time for him to retire. The officers of the department were servants of the public, and could only serve the public. It was their (the officers') duty, to encourage production—(hear, hear)—and the meeting having taken the turn it had, he thought it was his duty to retire. They were all practical beekeepers, and could govern their own affairs. If at any time they wished for information or assistance, the department would only be too glad to help them all it could.

The motion favouring the establishment of an association was then put and carried.

After some delay Mr. Cowen moved that Mr. Sutton should take the chair.

Mr. Charles seconded the proposition, which was carried, and the Secretary for Agriculture then left the room.

Mr. Sutton, in thanking the delegates for the honour conferred on him, thought that Mr. Cowen had strained the idea thrown out at the meeting. Whilst he and the others were desirous of forwarding the beekeeping industry, they had no desire to run counter to the department. Anyone who knew him could say that he had always tried to assist, by advice or otherwise, anyone desirous of gaining information on this subject.

Letters of apology for non-attendance, and wishing the convention success, were read from Messrs. McLarty, Warren, and McNeil.

It was agreed to make the annual subscription half-a-crown payable in advance.

The chairman, Messrs. Crawford, Smith, and Kline were appointed a committee to go through the Hunter River rules, with the view to reporting to the meeting at the evening session.

Mr. Sutton (Drakesbrook) having been appointed president, and Mr. Kline secretary and treasurer, the conference adjourned at 6 p.m. until 7 p.m.

On the resumption of business, the following additional office-bearers were elected:—Vice-presidents, Messrs. A. H. Smith, W. J. George, and McLarty; committee, Messrs. Ailnut, C. Smith, Williamson, Charles, Jacques, Andrews, and Masterton; auditors, Shipton and Gunn.

The revised rules of the Hunter River Association were adopted.

The Chairman asked if delegates had anything to bring before the association. If not, the business was finished. In connection with the addresses at the outset of that meeting, it was not their desire to have a monopoly or to obtain an exorbitant price for their honey, but to obtain a fair return; nor did they wish to run in antagonism to the department. They wanted to work hand-in-hand with the department, but had no wish to have the district flooded with so-called bee-farmers, as had happened in Victoria and New South Wales. He expressed, however, his conviction that it would be an advantage if the department would send inspectors out to inspect hives for foul broods.

Mr. Allnut moved a vote of thanks to the Department of Agriculture. He failed to see anything wrong in what the department had done.

Mr. Smith seconded the motion. He attributed the success of the conference to the exertions of the officers of the department.

The motion was carried unanimously.

Mr. Williamson took exception to the remarks of the Hon. the Minister with regard to increasing the number of beekeepers. The supplies were too much for the demand now, and he contended that the distribution of literature on the subject would do harm.

Mr. Allnut showed that at present 450,000lb. of honey were being imported into the colony, despite the 2d. per lb. duty. This meant that they must produce an article equal in quality to that imported if they were to overcome opposition.

Mr. Kline supported this contention, and quoted his experience in New South Wales and Victoria.

The Chairman explained many of the tricks of the trade which had been brought under his notice, and on the motion of Mr. Crawford it was subsequently decided that the committee should inquire into these matters and report to a meeting to be held a month hence.

The Chairman thought it would be a wise course to make the *JOURNAL* of the Department of Agriculture the official organ of the Association.

Mr. Crawford, whilst agreeing partly with the suggestion, contended that it would lead to a greater membership of the association if the committee issued pamphlets three or four times a year, on swarming, extracting the honey, and other important matters. These could be sent to all members, and it would give satisfaction to those whom distance prevented attending the meetings. He moved accordingly.

Mr. Allnut pointed out the costliness of this course, and held that the matter had better be left in the hands of the committee.

Mr. Crawford said he was only desirous of seeing the association successful, and he would guarantee £2 towards the cost of the first pamphlet.

Mr. Allnut withdrew his opposition and seconded Mr. Crawford's motion, which was carried unanimously.

Mr. Crawford drew attention to the Act, which rendered it necessary for every beekeeper to register. He explained the necessity of educating every beekeeper sufficiently to recognise foul brood when it appeared, and to enable him to place a standard article on the market. It was the men who could not do this, and through ignorance or negligence put forward inferior honey, who created a prejudice against the local article, and so kept down prices.

Members agreed to endeavor to get all beekeepers within their districts registered.

A vote of thanks was accorded the chairman for the capable manner in which he had conducted the business.

The Chairman having responded, a lively discussion followed.

THE BEEKEEPERS' CONFERENCE.

(From *The West Australian*).

The Beekeepers' Conference, held last week under the auspices of the Department of Agriculture, is, it may be hoped, only the first of a series of similar gatherings devoted to the subsidiary industries of the farmer and fruit-grower. The Producers' Conference concerns itself mainly with economics—political topics, and in these finds more than enough to exhaust the necessarily brief time at its disposal. The advisability, therefore, of convening special meetings of fruit-growers and vignerons and of those interested in agriculture, poultry raising and other rural industries is forced into prominence by the comparatively small attention that can be given to their special branches of production at the annual congress of the agriculturists. The intention of the Department of Agriculture to assist the representatives of these industries to come together is assuredly worthy of approval.

At the present time, so far as the price of honey can be accepted as a criterion, the local beekeepers should be doing fairly well. As Mr. Throssell pointed out in his inaugural address, the local supply is not yet sufficient for the demand. Despite a duty on the imported article of twopence a pound, within the last four years the colony has sent away £10,000 for honey. The largest local production was in 1897, when the output reached 94,000lb. The following year witnessed a drop of just about half that quantity, due mainly, it may be presumed, to the pest known as "foul brood," which is responsible for the widespread destruction of apiaries. But the valuable Act passed

last year should be of assistance in checking this and other enemies against which the beekeeper has to contend, and the establishment at Rottnest of a breeding farm for queen bees of a pest-resisting type should afford further aid of the most practical kind. The abolition of the protecting duty of twopence a pound, which will be one of the ultimate consequences of the adoption of federation, may render the pursuit less profitable than it is at present, but, unless the industry is to remain almost at a standstill, the exporting stage cannot be far distant. When that is attained, prices may be expected to drop to the level prevailing in the Eastern colonies. The difference at present would appear to be about 1d. per pound in favour of the local producers.

One important respect in which the West Australian apiarist seems just at present to be at a disadvantage as compared with his competitors in the Eastern colonies, is in the production of honey per hive. In 1896 and 1897 the yield was about 30lb. per hive. Then came disease, and in 1898 the yield had dropped to under 15lb. for the year. Under circumstances such as these the value of a duty to an industry which has not yet fully found its feet becomes most apparent. It is more than possible that if to the ravages of foul brood had been added the unrestricted competition of the South Australian beekeepers, the industry might have been placed in jeopardy. It may be hoped that the storm has now been weathered, and that before the full effects of competition have had time to manifest themselves a firmer foothold may have been secured. Even in the prosperous seasons, however, the yield per hive has fallen far below that of New South Wales. In that colony for the last five years the average has been 46lb. per hive, and for the last three years as high as 51lb. If, however, we turn to Europe and the United States, we shall find that Western Australia in normal years easily holds her own. In Greece, famous in the days of antiquity for its honey, the average yield is only 10lb. In Denmark it is 20lb.; in Russia, 18lb.; in Belgium, 25lb.; in Holland, 25lb.; in France, 24½lb.; Germany, 27½lb.; in Austria, 25lb.; and in the United States 21½lb. In New South Wales the average yield for the season ended March, 1899, was no less than 57 6lb., considerably more than double the output per hive in any of the countries mentioned above. As regards our own colony, it is probable, that with the introduction of better strains of bees, and an improvement in methods generally, the productiveness per hive will be considerably increased. Another point to which the Beekeepers' Association, formed as the outcome of the conference, will, no doubt, devote close attention is that of quality. It was suggested in the course of one of the discussions that in this respect room for improvement exists. Whether that be the case or not, it is certain that honey very readily lends itself to adulteration. The Association, knowing how much easier it is to lose a good name than to regain it, will, no doubt, do its utmost to prevent an inferior article from being placed upon the market. Quality being assured, West Australian honey should, at least in the local market, succeed in holding its own against all competitors.

GREEN MANURING WITH LUPINS.

Mr. G. Berthond, manager of the Experimental Plots at Drakesbrook, forwards the undermentioned article on Lupins taken from the *Leader*, he says:—

"I have often thought that some time in the near future the above-mentioned plant, which grows freely here, will be found to be of great value for improving our poor soils. It is not a good forage plant, stock do not care to eat it here, it grows very rapidly after the first autumn rains."

A short report by Mr. Lydgate, of Hawaii, on Fertilisation is, conceded as furnishing the best and cheapest solution of the question how to provide a remedy for worn-out sugar cane lands. Green-soiling, he writes, is perhaps the nearest we can come to occupying nature's methods of creating plant food that is at once available. We have practised green-soiling for several years, and have derived great benefit from it. The only plant that is used for this purpose is the lupin; this planted in the beginning of winter grows in four months to a height of 3 to 4 feet, covering the field with a heavy growth. At first considerable difficulty was experienced in ploughing this under because of the size of the plants and the immense amount of foliage; this has been overcome by the use of the "Secretary disc plough," which cuts them clean and turns them completely under, at the same time doing an excellent job of ploughing and harrowing combined.

The same subject is referred to by Dr. Hartmann. By a recent mail, he remarks, we received from the Agricultural station of the University of California, of which Dr. Hilgard is director, a parcel containing several pamphlets relative to lupins and other plants, which are considered as beneficial for fertilisers. This parcel may have been sent down specially after reading Mr. Lydgate's report referred to above; at all events, they are very acceptable at this time, when attention is being called to lupins and other fertilising plants. The pamphlet gives a full history of the lupins, which are grown in Europe chiefly as a cattle-forage plant, and they have long been and are still considered there as among the best of green-manuring crops. There are several species of lupins, including the blue, pink, yellow, white, Egyptian and others, 13 in all, some of which are not desirable to have on a farm. The "large blue lupins" are considered the best.

The legumes, says the pamphlet, combine all the points required of a green manure plant—nitrogen absorption from the air, deep-rooting, and at the proper stage of growth, that succulence which is conducive to quick decay, thus rendering the crop ingredients available at the earliest moment. Nevertheless, the ploughing in of other green crops or weeds, when convenient, should not be neglected. It should be stated that the absorption of nitrogen from the air is conditioned upon the formation of excrescences or tubercles upon the roots, these being formed by the bacilli possessing that valuable

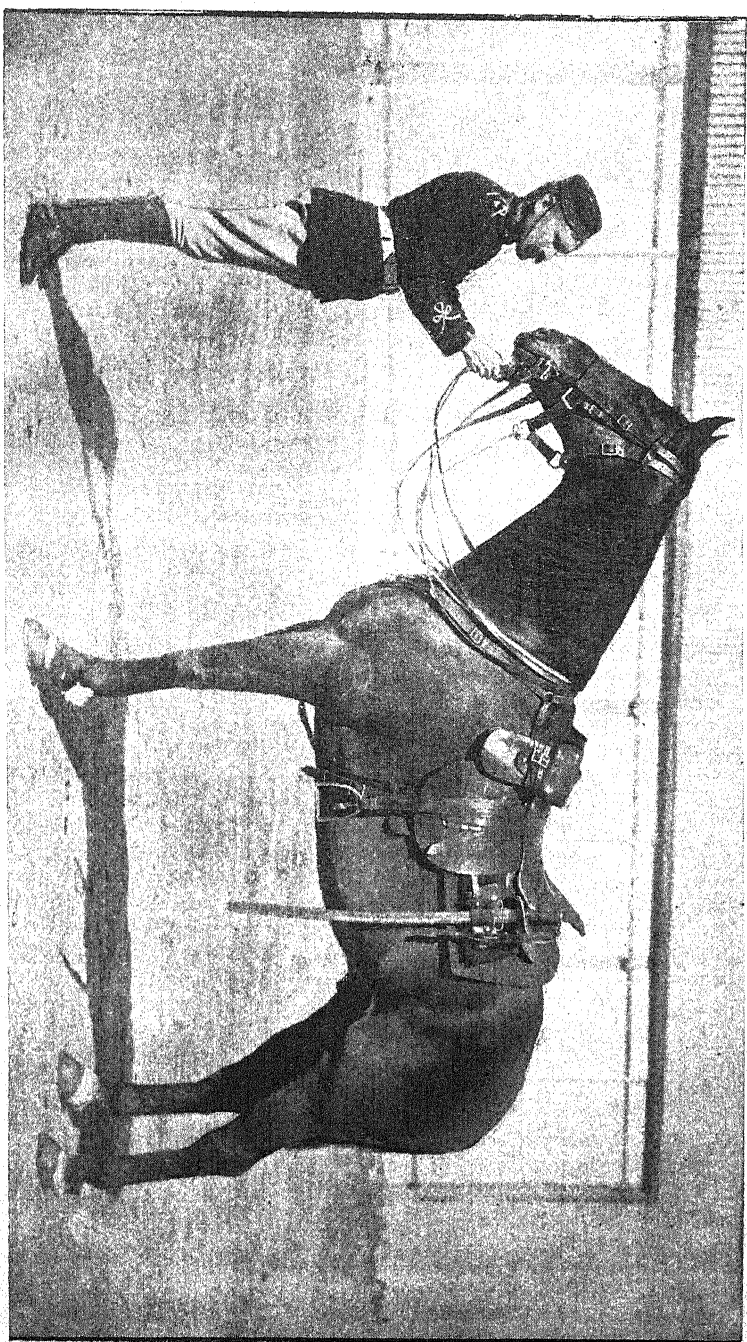
faculty. When the soil is abundantly supplied with available nitrogen compounds, tubercles may fail to form; and such failure may also result from the absence of the proper bacilli, rendering necessary the inoculation of the land. The pink and blue lupins are considered among the best for fertilising purposes.

In California there are 10 varieties of the lupin, of which the large blue has been found the best. There the success or failure of these plants depends almost entirely on their seeds being sown to catch the first rains. When lupins have not been previously cultivated, it may be necessary to inoculate the soil by transfer of small quantities of the soil from localities where lupins have been growing. The necessity of this inoculation arises from the circumstances that the bacteria peculiar to lupins do not make tubercles on plants of any other leguminous germs, and therefore are not found in soils where lupins have not grown. As to the method of planting, the custom in California is to use a beet drill, which is the least expensive, as 15 or 20 acres a day may be planted in this way. A beet cultivator is recommended for preparing the ground for planting. There can be no doubt of the great value of this plant in restoring the fertility of some of our over cropped cane lands, though perhaps not all of them would receive the same benefit. Just which fields need this treatment can only be ascertained by trial, taking first, perhaps, a small portion for an experiment. A few acres of a field planted with lupins, the remainder being treated with fertilisers in the usual way, would very soon show results which would determine their value. If the experiment were tried on different fields at the same time, the results would be still more satisfactory. One great point gained, if the experiment prove successful, will be the saving in outlay for manures, which is now a very large item of expense. The advantages of green manuring seem to be underestimated by the majority of farmers. When leguminous crops are used the following objects are gained: The physical properties of the soil are improved, the content of the humus is increased, and consequently the soil plant food is brought from lower to higher levels, and the most expensive plant food—nitrogen—is not merely procured from the air, but is added to the soil when the plants decay. When given a dressing of potash and phosphates these crops are especially valuable for renovating worn and barren soils, and upon better land, combined with rational soiling, they furnish large quantities of stock food, thus permitting of a larger number of animals being kept and of a considerable saving of manure.

REMOUNTS FOR ARMY PURPOSES.

BY PERCY G. WICKEN.

The war in South Africa is using up cavalry horses at a great rate. From the beginning of the war to March 30th, 1900, it is calculated the Imperial Government has had to purchase 48,000 horses, and it was estimated that if the war lasted another two months (which it has done), at least 10,000 more horses would be required.



HEAVY CAVALRY.

This would bring up a total of over 58,000. This is in addition to 27,000 mules which have been bought, horses which have been voluntarily provided by the colonies, and those belonging to the various regiments at home which went out with the troops.

A large number of horses have been sent from the colonies with the various contingents, and a lot purchased in the Eastern colonies on behalf of the Imperial Government. Western Australia has supplied 400 horses with the contingents sent from here, and those sent with the last contingent compared very favourably with any of those sent on previous occasions and from the other colonies.

The latest report received from the seat of war with regard to horses is dated June 20th, and is as follows:—"General Sir F. W. Forestier-Walker, in command of the lines of communication in Cape Colony and the Orange Free State, has issued a report in regard to the quality of the imported horses. He reports that the Australian horses are the best for cavalry purposes, the English being next in order of merit, and the Argentine horses third. The Cape horses are the best for the mounted infantry, the Indian and Australian animals coming next. Australian horses are delivered in South Africa at an average cost of £55 per head, Argentine £26, and English at from £70 to £75."

This speaks very well for the enduring qualities of the Australian horses, and the price, although below that of the English, is considerably above that obtained by the Argentine Republic, whose competition we have most to fear, but who have a much greater distance to transport their horses.

Apart from the extraordinary demand for horses caused by the present war, there is always a demand for a good stamp of horse for remounts for the troops in India and elsewhere. The conditions for raising horses for this purpose in Western Australia are so favorable, that if proper attention was given to the subject, this should develop into one of our most profitable export trades. The distance between our more northern ports and India is so short that it should be sufficient to give this colony a great advantage in the export trade of sending horses to India.

The Government of India are now breeding large numbers of horses for the use of the army in India, and even if the trade from this source decreases, there is likely to be a demand in Europe, if horses of the right stamp can be supplied. The increased facilities offered by the steamship companies becomes every year greater, and with the large vessels now running, the percentage of loss is very small. The total number of horses required yearly by the nations of Europe for military purposes in time of peace is 80,000, and the demand is with difficulty met, while in the event of war breaking out the demand would be enormous. The large tracts of country available in this colony could be put to much worse use than for breeding a type of horse suitable for military purposes. There is also a good local demand for horses of the same type. It is this type of horse that will sell and are of use for all classes of work in preference to the number of weeds we so often see about.

There are four types of horses required for military purposes, viz:—

1. The heavy cavalry horse of bone, quality and power, 16 hands.
2. The light cavalry horse of good body and good quality, 15·2 hands.
3. The artillery horse of power and activity, 15·2 to 16 hands.
4. The transport horse of bone and power, 15·2 hands.

Figs. 1 and 2 show the type of horse required for the heavy cavalry. Figs. 3 and 4 show the type of horse required for the light cavalry.

The breeding of suitable horses for the Indian and European trade can best be undertaken by the holders of small and medium-size farms, and it should prove a very profitable undertaking. The mares required to breed the type of horse required are such as could be worked on the farm for the greater period of the year, and also the youngsters would derive the benefit of being fed on the farm during the time of the year when feed is scarce in the paddocks. Another advantage which the small holder has, is that the youngsters, being accustomed to running about round the stable and homestead, are much more docile than those bred on a large run.

As the Imperial authorities prefer to buy their horses unbroken, very little handling would be necessary, as they can be taught to lead with little trouble. It would certainly be a great help to the small farm owner if he could breed two, three or more such horses each year, which at five years old would be worth about £30, and the feed they eat would never be missed.

Colonel Williams, of the Indian remount service, paid a visit to these colonies some time ago to ascertain how far the breeders here could supply the demand for the Indian service, and after visiting several of the studs in Australia, he expressed himself as astonished at the capabilities of the herbage, climate and economic conditions for producing the class of horse wanted in India. It is now generally admitted by the authorities that the most suitable horses, and those that stand the hot climate best are bred in Australia. The class of horse required are those stated above. The British soldier and his accoutrements weighs from 16 to 18 stone, and for such a weight a weak, weedy animal is useless. For a suitable horse the price paid is £46 to £50, at five years old and broken to lead only. It costs about £11 sterling to land a horse in Calcutta, which leaves a very good margin for the breeder.

The majority of the horses exported to India from the Eastern colonies are purchased by dealers and middlemen, who travel round the country looking out for likely horses, and pay from £7 to £10 for them and ship them over two or three hundred at a time—thus realising a handsome profit.

For breeding the type of horse required, the mare should be clean-legged, medium-sized, with good bone and head, good action

and temper. She should stand between 15 and 15·2 hands high, and should be as well bred as possible. The type required would be a cross between a thoroughbred stallion and a draught mare.

Much depends on the stallion used. A thorough well-bred hackney stallion is the most likely to give good results. Fig. 5 shows an illustration of Mr. P. Charley's Hackney stallion "Lord Derby." Mr. Charley has a very fine estate at Richmond, N.S.W., and is an enthusiastic horse breeder. He has imported some of the best horses and cattle to be obtained, and "Lord Derby" is one of the best sires. His stock is largely sought after, and is mostly secured by the N.S.W. Government for the use of the mounted police force, and for the officers of the military department. He is the type of stallion that we require in this colony, if we are to be successful in producing horses suitable for remount purposes.

(To be continued).

OUR NATIVE SALT BUSHES.

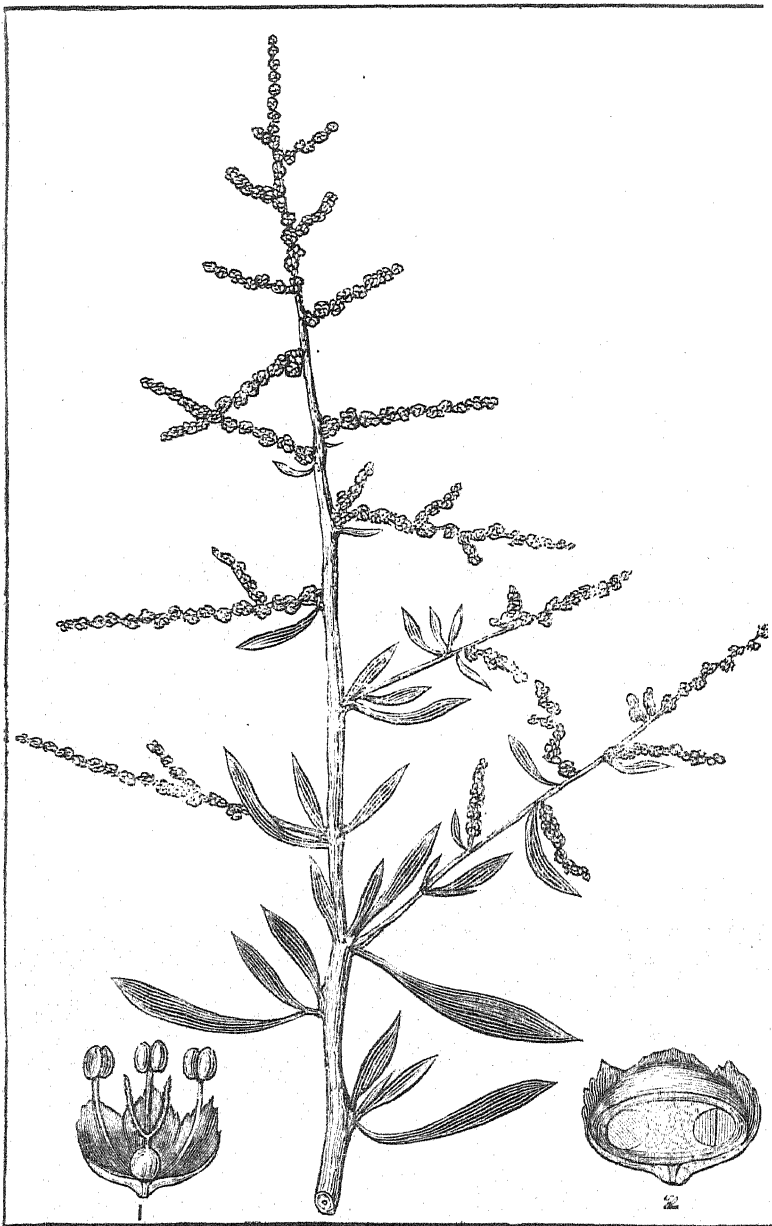
BY THE GOVERNMENT BOTANIST.

The Saltbush family has received the name *Salsolaceae* on account of a large number of the plants composing it tolerating or preferring a soil containing salt, so that the designation is a very appropriate one. The other title, however, by which it is known, namely, *Chenopodiaceae*, is in more general use by botanists, and is derived from the name of one of the oldest and in Europe best known of its genera, *Chenopodium*, or Goose-foot, which bears reference to the shape of the leaves of some of its species.

Chenopodium includes herbaceous and shrubby plants, with alternate, flat, more or less fleshy, leaves; the flowers are small, sessile, and in clusters variously arranged, and are mostly hermaphrodite; the fruit is a dry, flattened nut, enclosed in the perianth, which is herbaceous, and does not enlarge after flowering as in *Atriplex*.

Chenopodium nitrariaceum is a rigid shrub or undershrub with diverging sometimes spine-like branchlets; the leaves are entire, narrow, an inch or less in length, and sometimes clustered at the base of the flowering branches; the flowers are mostly bisexual, with a few males intermixed, and are arranged in small clusters along spikes terminating the branchlets; the seeds are flat, and enclosed in a thin membrane covered by the unaltered perianth.

All kinds of stock, and particularly sheep, are fond of this bush, and it produces seed abundantly. It is found in its natural state in all the Australian colonies, especially about river flats, and has been naturalised for pastoral purposes in the South of France and Northern Africa. The plant is not unlike *Rhagodia Billardieri* in appearance, but may be distinguished by the dry fruit and the tendency it shows to form spines.



CHENOPodium NITRARIACEUM.

1. Flower with half of perianth removed. 2. Longitudinal section of a fruit Both magnified

Chenopodium auricomum is an erect, more or less hoary or mealy-white herbaceous perennial, growing to a height of 3 to 5 feet, with ovate, oblong, obtuse leaves, on rather long stalks, and sometimes lobed near the base, and the clustered flowers in spikes terminating the branches.

This species is found as a native in all the colonies except Western Australia, and is sometimes called "bluebush." It is used by bushmen as spinach, and Mr. F. Turner recommends that it should be cultivated as such, when the production of other vegetables is impracticable. It is highly praised by squatters, who consider it a very valuable forage plant, enduring the most severe heat and drought.



CHENOPODIUM LEPTOPHYLLUM.

Many species of *Chenopodium* have been known from early times and cultivated as pot herbs, or made use of for their medicinal qualities; and some are familiarly known all over the world as weeds of cultivation.

Chenopodium ambrosioides is a plant of American origin, well known in this colony as a troublesome weed; and as it is not eaten by domestic animals, while spreading over cultivated paddocks, many

anathemas are hurled against it by farmers. It is, however, used medicinally in France and other countries, under the name of "Mexican tea," as a tonic and antispasmodic, while the perennial variety *anthelminticum* has received its botanical name, as well as the popular name "wormseed," from its use against worms. These therapeutic properties are due to an ethereal aromatic oil, having a somewhat disagreeable odour, and contained in minute glandular hairs spread over the surface of the plant, from which it is readily dissolved out by infusion in water for use as a medicinal draught. When so treated, the plant itself, deprived in this way of the objectionable oil, may be very nutritious fodder; and the suggestion may be made to those afflicted with the weed, to offer it to cattle after it has been scalded and freed from its oil. The plant is very common in Perth, brushing frequently against our knees as we pass along the streets, while in corners of the public parks and gardens it may be seen growing luxuriantly to a height of about five feet, and producing its seeds in myriads.

Chenopodium carinatum is another species condemned as a useless weed that no animal will touch, but possibly if treated in some simple way, by scalding or as ensilage, it may be found to recommend itself to the palate of cows or bullocks. It is a native of all the Australian colonies, and also of New Zealand and Polynesia. *C. leptophyllum* again, narrow-leaved goosefoot, is recommended as a forage plant in North America, where it is a native, growing naturally in dry soil in the Northern and Western States.

Chenopodium Bonus Henricus, *Blitum*, *Botrys*, *olidum*, and *Quinoa* are all in use in various parts of the world as pot herbs or for domestic medicine; and the last-named, *Quinoa*, a native of South America, is much cultivated in Peru and Chili for the sake of the mealy substance in its seeds, of which porridge or gruel is made, while used also as an external application in the form of decoction or poultice.

When we consider the uses to which so many chenopodiaceous plants have been applied for their nutritive qualities, we may presume that the family, as a whole, are specially fitted to serve as fodder for the domestic animals. Chemical analysis has proved the high nutritive value of some of the native species of *Atriplex*, and the same tests applied to the common weeds would probably indicate a similar composition. Seeing that a large number of these survive the regular crops in cultivated ground, while the family generally give a special character to the natural vegetation and landscape of the most arid or otherwise inhospitable regions, where few other plants can bear the climate or soil, their importance as forage plants occupying extensive tracts of Australia is self-evident. Although their value may not be capable of being definitely capitalised, like that of the natural forests of the country, the destruction of these plants by overstocking should be regarded as contrary to the public interest, and as much a matter for legislative control as the cutting out of commercially valuable trees in the forests occupying the more favored parts of the territory.

CARRIAGE OF STOCK.

ROOFLESS WAGGONS A SUCCESS.

Considerable attention was some time ago directed to the question of the carriage of stock by railway, and trials were made of cattle trucks which provided for the animals being watered in transit. A number of runs which were made, however, seemed to show that the question of watering in transit was not likely to be successful. At the same time trials were instituted of several waggons which were without roofs, the covering being removed from them. Experiments have been made with cattle during the past nine months, and the evidence obtainable seems to show that they are a success, local traffic officers reporting that the stock appear to travel better, that they travel much cooler, and as they were able to see what was going on around them the animals were much less frightened. The officer in charge at Flemington also, who had taken particular notice of the beasts which arrived at the metropolitan market in these roofless trucks, stated that he had not found that any of them were affected by sparks from the engine, as was anticipated would be the case, but the cattle invariably were turned out from the waggons in good order, and none of them were recorded to have fallen in transit.

Inquiries from other colonies indicate that the results are equally gratifying where the practice is in force, such as in Queensland and New Zealand. In Queensland the roofs were removed from the cattle waggons five years ago, and the outcome was entirely satisfactory. It was found that, from tests which were made with the open and closed waggons with the thermometer, the roofless waggons were much better ventilated, and although the cattle were exposed to the sun they actually kept cooler. Another illustration of their value is afforded by the fact that since the roofs have been taken off there have been practically no complaints. The New Zealand railway authorities are equally emphatic. Formerly both types of trucks were used in the Northern Island, but the stockowners (the persons most concerned) prefer the open top as being easier to load, better ventilated, and better adapted for the conveyance of stock, and the covered trucks have therefore been withdrawn from the North Island. On the South Island, where the climate is more rigorous than in any part of Australia, the open waggons are preferred for horses and live stock, but the covered trucks were sought after for the conveyance of stud stock, owing to the better protection of such stock in the cold weather.

The experience thus gained in the two extremes, the extremely hot climate of Queensland and the cold weather of New Zealand, seems to establish the fact that the open trucks best meet requirements, and it is understood that the matter is now being seriously considered by the Railway Commissioners of this colony as to whether, in all new waggons, they will not do away with the roof and have the open trucks.—*Sydney Daily Telegraph*.

FUMIGATING STOCKS.

(From N.S.W. Agricultural Gazette).

If nurserymen were to take the trouble to fumigate all their trees before sending them out, and give a guarantee to that effect, they would, I feel sure, be amply repaid for their trouble by the in-

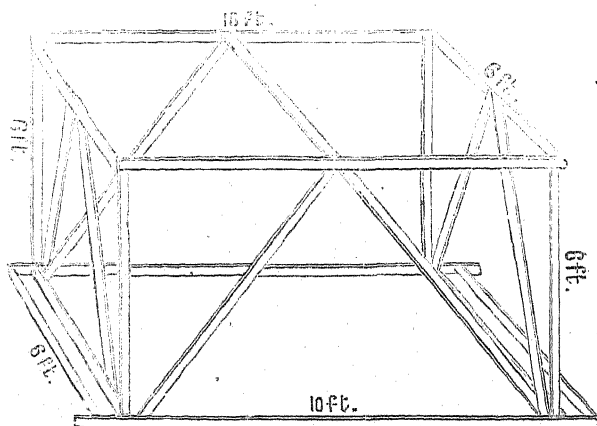


Fig 1

crease in the number of orders they would receive, and the expenses of doing so would be very small. In the first place a cheap portable-room could be made in the following manner:—Take 1 by 3 Oregon

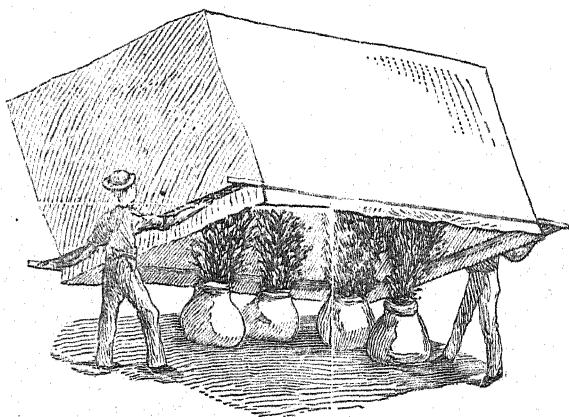


Fig. 2.

pine, and make a frame 10ft. long, 6ft. wide, and 6ft. high (10 x 6 x 6), leaving the bottom side pieces projecting over the ends about 1ft., and fastened to this a pole of 1 x 3 Oregon across the end, which will



LORD DERBY, Hackney Stallion.

serve as a handle to raise and lower the room when it is required for use. When the frame is finished, cover it with hessian, and give it two good coats of paint. This will make it quite air-tight. If covered with canvas it would, perhaps, make a nicer job. Such a room would last for years, and from two to three hundred trees could be treated at one time, as shown in Fig. 2. Or, as perhaps would be the best plan, it could be put over the young stock as they grow in the nursery beds wherever disease is found.

For scales on deciduous trees, such as San Jose, &c., $3\frac{1}{2}$ oz. of cyanide, $5\frac{1}{2}$ oz. of sulphuric acid, $8\frac{1}{2}$ oz. of water, would be a sufficient charge for a room of the above dimensions, and would cost only about $4\frac{1}{2}$ d. If citrus trees are to be treated, the charge could be reduced to one-third. This should be sufficiently strong to kill any scale or insects on any trees, and the purchaser would know that he was starting his young orchard free from all pests.



Fig. 3.

Of course, trees may be dipped for a few seconds in a tank which would hold about 100 gallons of either resin wash or kerosene emulsion, and which would need to be, say, 4ft. deep by 3ft. square; but one immersion would not kill all the scales as would the treatment with hydrocyanic acid gas, and therefore for this reason I would strongly recommend the latter treatment for nursery stock. For older trees I would use whichever wash was found to do the best work at the least cost, whether it be hydrocyanic acid gas, resin wash, or kerosene emulsion, all of which are highly spoken of. From experiments carried on by myself, I find that resin wash and kerosene emulsion do about the same work, and are far ahead of any of the other washes; but for trees which are really bad, the cyanide is the most effective, and it would pay to have a tent or two to treat very bad trees for the orchard as well as the portable room for nursery stock.

A small fire would be necessary to keep the mixture from congealing. The trees would afterwards have to be drained head downwards.

SHIPMENT OF FRUIT TO ENGLAND.

ENCOURAGING REPORTS.

The Department of Agriculture is in receipt of reports sent to the Hon. the Colonial Treasurer by the Agent-General, referring to the first three consignments of fruit forwarded to London this year. Eight consignments altogether have so far been despatched.

The fruit left Perth on the 24th February, the 10th and the 24th March, and was, under instructions from the Agent-General, examined and reported upon by Messrs. Keeling and Hunt, fruit brokers, London, on the 3rd and 24th April, and 1st May respectively. Grapes, pears, and apples formed part of the consignments. The grapes consisted of Muscat of Alexandria, Doradillo—known as Denia on the London market, although not the name of the grape—Black Prince, and Wortley Hall. They were the produce of vineyards along the Swan, and all packed with cork dust.

Messrs. Keeling and Hunt speak of the Muscatels as of “rather weak flesh, some bunches in wasty condition, certainly not a strong enough grape for shipment to England. The Doradillo, they state, are exceedingly weak on stalk, in poor condition, and of no use whatever for shipment to England. The Black Prince and Wortley Hall are described as fine, bold grapes, flesh too tender, and berries too weak. Not suitable for shipment.”

“On the whole,” says Sir E. H. Wittenoom, “the grapes did not stand the voyage. The berries fell away from the stalk on being moved, and appeared mildewy at the point of juncture, while the flavour was seriously affected thereby.”

Says Mr. Despeissis, the Viticulture and Horticulture Expert to the Department of Agriculture:—“I must state that I never entertained great hopes regarding the carrying capability of the Muscatels. Two years ago some of these grapes were shipped to England. Cork dust was used for packing some, and paper shavings the rest. Those grapes, packed with cork dust, arrived in a fair state of preservation, whereas the others were to a great extent damaged. As a matter of fact, very few grapes from Australia have yet been successfully landed in London, the Almeria being an exception. The fact, however, that the distance between Western Australia and England is much shorter, justified a further experiment with these more tender grapes. When some of the new varieties, noted for their good keeping qualities, which this department introduced a couple of years ago, are more widely distributed, I have no doubt that some will even surpass the Almeria as packers, and the shipment of grapes from Australia to distant markets will then become a less speculative undertaking.

Pears have never successfully stood the test of a long sea voyage, and the cases of Bartlett's sent arrived in a rotten condition. ‘We cannot recommend pears for shipment,’ say Messrs. Keeling and Hunt, ‘as very rarely indeed have we seen them arrive anything like sound.’ I am not prepared to endorse this opinion to its full extent.

The pears forwarded were, if anything, too much on the side of ripe, and had they been picked and sent a week or two earlier, they would certainly have stood a better chance of arriving in good order. When varieties like Broome Park, Napoleon, Keiffer's hybrid, and Winter Cole, picked at the proper period, are shipped, the result, I have no doubt, should be very gratifying."

The apples sent have fully vindicated the reputation of the Western Australian fruit sent to London. The remarks concerning them are most encouraging.

Besides the shipments consigned to the Agent-General by this department, the Hon. F. H. Piesse sent to his son, Mr. F. J. R. Piesse, now residing in Glasgow, some Jonathan, Cleopatra, and Dunn's Seedling apples, respecting which I quote some remarks bearing on the condition in which they arrived, which are of great interest to shippers and growers alike:—Jonathan: This case is the one which took the first prize for best case packed for export at Katanning a month before shipment. It arrived in Glasgow two months after. "Only one bad apple is reported in the case on arrival; several were marked at sides where pressed together. On the 15th May some which were kept were in perfect condition. Flesh very crisp and juicy, flavour good. A friend who tried them says there is only one apple he likes better; that is the Newtown Pippin."

"Cleopatra, or New York Pippin: Arrived in splendid condition not bruised at all, or any bad. Flavour excellent; consider these the best of the three. Saw some Australian Cleopatras in shop window in Glasgow. Upon inquiring, found price was for best, 11d. and 1s. per lb.; and for others, 8d. and 10d."

"Dunn's Seedling, or Munroe's Favourite: These arrived in the pink of condition, and are thought by most of those I distributed them amongst as the best. There is no doubt that it will be a splendid keeper."

"I think that all Australian apples with American names should be re-named. For instance, a friend of mine who saw some apples in a window asked the name, and was informed they were New York Pippins, from America, whereas they came from Australia, and are known there as 'Cleopatra,' and instead of Australia getting the benefit as the country producing the fruit, America does. Australian apples are not too favourably received in Glasgow, the preference being given to Canadian, which are just going out as the Australian come in.

"Would strongly advise uniform grading, and think our cases should have three divisions instead of two, as the weight of the fruit causes injury to itself, when thrown about as the cases are by rough handling. Our fruit comes a long way, and takes five to six weeks in transit; the Canadian under two weeks, therefore arrives in better condition."

In their reports to the Agent-General, three of which have already reached us, Messrs. Keeling and Hunt thus comment on the apples sent by the department:—Shipment of 24th February, per Oroya, case No. 5: Trivett's Seedling (Woodbridge, Guildford), a

good looking apple but rather soft. Altogether a fairly satisfactory fruit. Condition good. Suitable for this market. (This apple, a Victorian Seedling, is well coloured, small to medium size, suitable for packing; is amongst the first of the early packing sorts; the tree is blight proof.)

Case No. 6. Emperor Alexander; Gravenstein, Twenty ounce, from Mr. Warburton, Cranbrook: Very large apples, but too soft for export to England. Crow's Egg: Mr. Warburton, Cranbrook, a very common apple: too soft for export. N.B.—None of the foregoing varieties of apples should be sent to England, as they would certainly show a heavy loss. I must remark that although correct in the main, and whilst quite in accord with the London fruit brokers, these apples have been shipped under great disadvantage. They made up an attractive collection shown by the growers at the Autumn fruit and flower show of the Royal Agricultural Society in Perth, and as there were only a few of each, and these of different sizes and shapes, this particular case proved most difficult to pack. Several of the fruits had, besides, been pricked by pins fastening the cards giving their respective names at the time they were displayed on the table at the show, and, therefore, were absolutely unsuited for export.

Also from the same growers the following sorts were sent, which were reported on as follows:—American Summer Pearmain: A useful apple, of good appearance. Ribston Pippin: A very excellent sample, eminently suitable for the London market. Cleopatra: A fine green apple, very hardy, and suitable for this market. Adam's Pearmain: A very good apple; viz., hardy and suitable for this market. N.B.—This sample is one of the best Adam's Pearmain we have ever seen. Queen: Another very good apple, well suited for shipment to this market.

Shipment of 10th March, per Ophir, cases 1, 2, and 3, Kentish Fillbasket: Messrs. Silbert and Sharp: A fair quality apple, some fruits rather soft, suitable for shipment to England when apples are scarce, but not when plenty of hardy apples could be sent. More care should be exercised in sorting. Case 5, Cleopatra, J. Weidenbach, Canning: Like other samples seen at your offices, a very excellent fruit, eminently suitable for shipment to England. Case 8, Cleopatra, from Illawarra Orchard Company, upper Darling Ranges: The same quality and kind, but a little more ripe. Case 9, Dunn's Seedling, Illawarra Orchard Company: A handsome apple, but too large and too delicate for shipment. This case contained some waste. Case 10, Jonathan and Rome Beauty (?) Woodbridge, Guildford: All sound and suitable for shipment.

Shipment of 24th March, per Oruba, case No. 1, Northern Spy, Edw. Brockman, Warren: A large apple in fairly good condition (packed in coloured paper, which should be avoided), quite suitable for shipment. Cases 2, and 3, Dunn's Seedlings, Illawarra Orchard Company: A handsome, bold apple, a little soft, but a much better sample than the case reported on by us (ex Ophir) on the 24th ult. On the sample ex Oruba we could confidently advise shipments of this variety. Case No. 5, Cleopatra, Silbert and Sharp. Very mixed sizes,

but we fancy this apple for shipment very much. Cases 6, and 7, Kentish Fillbasket, Silbert and Sharp: See above shipment ex Ophir. Case 8, Cleopatra, Woodbridge, Guildford: Smaller and greener than No 5, but excellent for shipment. Case No. 9, Jonathan, Woodbridge, Guildford: A hardy apple of very good appearance, very suitable for shipment.

Commenting on these shipments, Sir E. H. Wittenoom remarks:—"The apples arrived in good condition, and seemed to have suffered little from the effects of the voyage. Some I distributed, and quote hereunder the remarks from Sir Robert Herbert, Permanent Under-Secretary for the Colonies: 'Very many thanks for the splendid Western Australian apples, which you have been so kind as to send me. I have never seen more beautiful, or tasted better fruit, not even, when I drove the Tasmanian apple cart some years ago. I was not at all aware that Western Australia could send home such fine extra tropical produce, other than grapes.'"

NEW OATS AND BARLEY.

In the annual report of the Ontario Experimental Farm the following varieties of oats and barley were mentioned as having yielded remarkably well. The Secretary Department of Agriculture has written to Canada to obtain a quantity of seed which, on arrival, will be tested at the Drakesbrook Experimental Plots so as to ascertain its value for this colony. The following is the Canadian report:—

"*The Joannette Oat* yielded 89 bushels per acre and stands at the head of the list; it is a black oat which was imported from France in the spring of 1889. It possesses a very short straw, and is suitable only for sowing on land which naturally produces a large amount of straw. As this variety stools abundantly, there is great danger of using too much seed. Four pecks per acre is usually quite sufficient. As the grain is apt to shell if allowed to become thoroughly ripe, it is best to cut while the crop is somewhat green. The crop should be bound in small sheaves, as the straw is fine, and large sheaves are too slow in drying. The grain of the Joannette oats is of excellent quality, as it is one of the thinnest hulled varieties in cultivation. The thinness of the hull, however, makes it necessary to use caution in threshing the crop, in order to prevent a large amount of the seed from being hulled in passing through the separator.

"*The Mandschuri Barley*, which stands at the head of the list, yielded 77 bushels per acre, it was imported from Russia. It produces a good length of straw, which usually stands up well and is comparatively free from rust. Not only has it given good results in the experimental grounds, but it has been grown with most satisfactory results in large fields on the College Farm. It has also been distributed throughout Ontario in connection with the co-operative experimental work, and as a heavy yielder it has decidedly given the best results of all the varieties of barley which have been tested over the province."

REPORT ON GRAIN SHIPMENTS.

As the result of a suggestion made by the Hon. Minister for Lands last November, a trial shipment of grain was collected from various districts in the colony and forwarded to the Agent-General for report, and to be sold on the London market, so as to test the value of grain for milling purposes; 289 bags were forwarded, they comprised 245 bags of wheat, 25 bags of barley, and 19 bags of oats, and were obtained from the following firms:—

Wheat,	30	bags,	F. Pearse, Dongarra.
"	30	"	F. & C. Piesse, Katanning.
"	30	"	T. Clinch, Greenough.
"	30	"	Empire Flour Mills, Beverley.
"	40	"	Farmers' Roller Flour Milling Co., Northam.
"	15	"	H. Leeder, Toodyay.
"	25	"	R. Forrest, Bunbury.
"	15	"	J. Hamersley, Newcastle.
"	30	"	Empire Flour Mills, York.
Malting Barley,	15	"	C. McManus, Irishtown, Northam.
"	"	10	" Dalgety & Co., Wagin.
Algerian Oats	15	"	A. R. Adam, Pinjarrah.
"	"	4	" Hon. G. Throssell, Northam.

Small bulk samples were taken from this grain before shipping, and were forwarded per mail steamer to the Agent-General for W.A., London. These samples were submitted to Messrs. Berry, Barclay & Co., London, for their inspection and report. A reply has just been received from them as follows:—

" Having examined the undermentioned samples in your office, we beg to report as follows:—

Wheat from	Empire Mills, York.
"	Empire Mills, Beverley.
"	Roller Mills, Northam.
"	T. Clinch, Greenough.
"	F. Pearse, Dongarra.
"	H. Leeder, Toodyay.
"	F. and C. Piesse, Katanning.

These are all fine, bold wheats, well grown and of even berry.

Wheat from J. Hamersley, Newcastle.

Fine, strong, but less bold and regular.

Wheat from R. Forrest, Bunbury.

Fine, but not so regular and well grown as the other samples.

These samples are all superior to the standards of the crop 1899-1900 in South Australia and Victoria, which have been sent here by the Adelaide and Melbourne Chambers of Commerce, and they would fetch the top price for Australian wheat in our market.

WEST AUSTRALIAN BARLEY.

C. McManus, Northam.

Dalgety & Co., Wagin.

Fair color, good sized berry, but harsh and irregular, too flinty, and not well enough dressed for this market.

WEST AUSTRALIAN OATS, "ALGERIAN."

A. R. Adam, Pinjarrah.

Hon. G. Throssell, Northam.

These are fully equal to the Algerian oats grown in Victoria, but they are not a description which is well adapted for sale in the English market.

Your obedient servants,

BERRY, BARCLAY & Co.

To Agent-General for W.A., London."

The bulk samples will be exhibited by the Agent-General in London before being sold, and account sales will be furnished in due course.

ADOPTION OF THE TWO-BUSHEL BAG.

The first step in the cheaper handling of the wheat surplus of the colony has been taken by the Farmers' and Settlers' Co-operative Association, Sydney, New South Wales, and will come into vogue the ensuing harvest. It consists in the adoption of the two-bushel wheat pocket, instead of the ordinary sack holding four bushels. The association named has ordered a supply for next season's crop, and it is probable that they will soon be universal throughout Australia. There is not a very great saving on the price of the small bag, but it possesses this advantage, that it can be conveniently handled by one man. The cost per dozen, at present rates, is 2s. 6d., while the four-bushel sacks cost 5s. 4d. per doz. There is, therefore, a saving of 4d. on every forty-eight bushels of wheat. The smaller bags are also relatively the lightest, for each one weighs 12 oz., as against the corn-sack, which weighs 2½ lb. When the bags are weighed as wheat, which is the usual custom, the farmers will get a trifle less by using the lighter bags, as two pockets only weigh 1 lb. 8 oz. compared with 2½ lb. for each sack. This is a small matter compared with the advantages of handling, not only on the farm, but in loading trucks and ships. The experiment will be watched with much interest. The Farmers' and Settlers' Association now do a large business in the export of wheat, and the efforts being made by this body to reduce the expenses in shipping grain on the co-operative principle, both in bags and commissions, are receiving strong support from producers throughout the colony.

WHEAT CROP OF THE WORLD.

The statistician of the United States Department of Agriculture has issued a statement showing the wheat crop of the world for the five years, 1895 to 1899. This statement includes the department's first estimate of the crop of 1899 and a revision of estimates of the four preceding years. Official crop reports of the countries enumerated have been utilised where such reports have been obtainable; in a few instances, where official data were not issued or had not yet been received, estimates have been based upon the information which seemed most trustworthy.

Commercial interest in this statement naturally centres in the crop of which a portion still remains in the hands of producers and dealers, the crop of 1899. The sufficiency of this crop to supply all demands during the present crop year would seem to be incontestable. The aggregate world's production in 1899 amounted to 2,725,407,000 bushels, a decrease, it is true, of 195,638,000 bushels, or a little less than 7 per cent. from the crop of 1898; but, compared with the average of the four preceding years, 1895 to 1898—a comparison which is obviously more satisfactory—the 1899 production shows an increase of nearly 61·3 per cent., or, expressed in quantity, of 161,833,000 bushels. The increase from year to year in the amount consumed, a fact that is universally conceded, has doubtless so enlarged the absorptive capacity of the markets that last year's crop may prove no more than sufficient for consumption and necessary reserves.

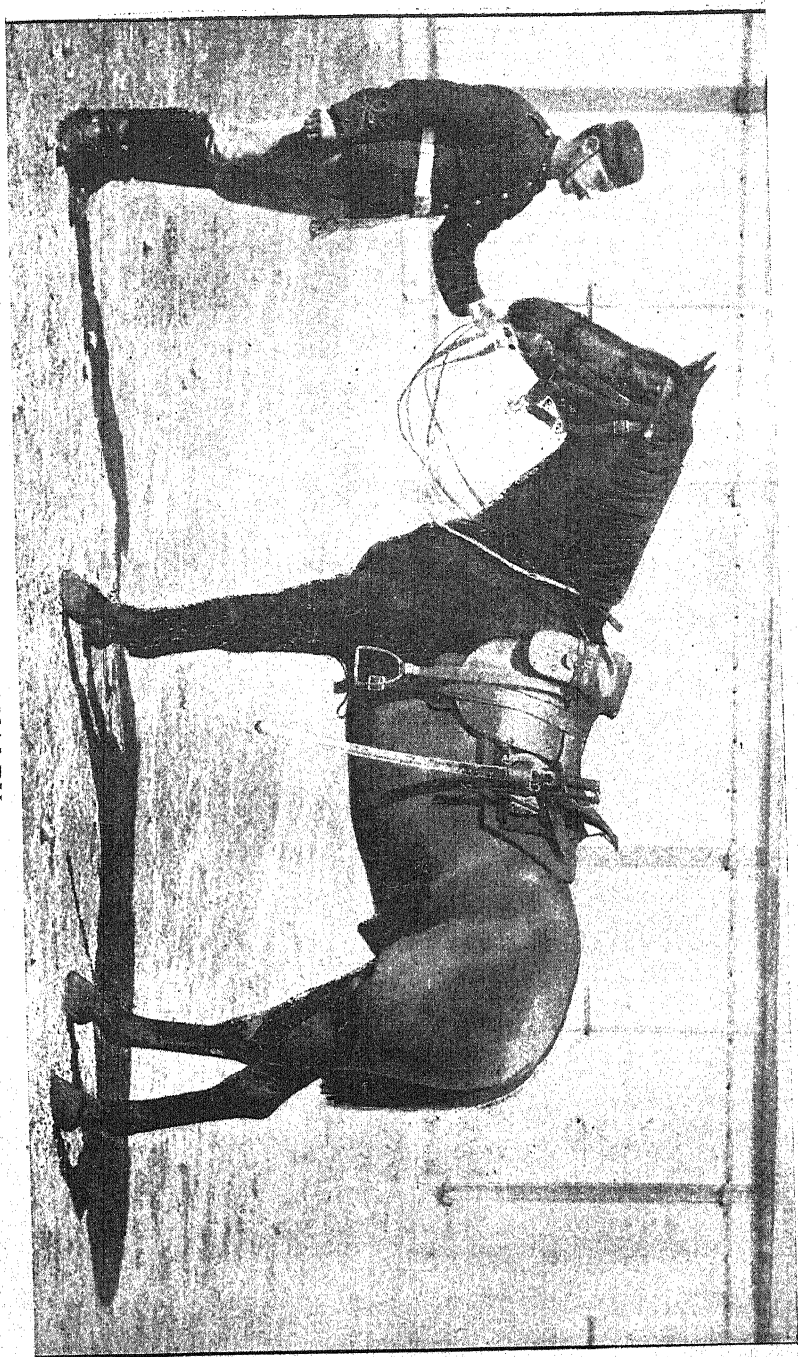
The variation in the quantity of wheat produced on each continent in 1899 from the quantity produced on the same continents in 1898 was as follows:—

	Bushels.
North America (decrease in 1899)	136,030,000
Europe (decrease in 1899)	80,154,000
Asia (decrease in 1899)	35,575,000
Africa (decrease in 1899)	10,830,000
South America (decrease in 1899)	45,728,000
Australasia (decrease in 1899)	21,232,000
World (decrease in 1899)	195,638,000

A simple statement by continents of the variations of the crop of 1899 from that of 1898, resulting in a considerable decrease in the first-mentioned crop, does not, however, bring out the important feature of the situation. A comparative statement of the proportion of the total world's crop which each continent has produced annually will serve the purpose. As a matter of interest the proportions are given for the five years.

Percentage of world's crop produced on each continent:—

Continents—	Per cent.				
	1895.	1896.	1897.	1898.	1899.
North America	20·61	19·10	26·68	25·96	22·83
Europe	56·31	60·21	51·85	54·08	55·02
Asia	16·62	15·13	16·79	14·88	14·65
Africa	1·97	1·74	1·67	1·60	1·32
South America	3·24	2·30	1·77	2·28	4·12
Australasia	1·25	1·03	1·24	1·20	2·06



LIGHT CAVALRY.

A fact that strikes the attention especially in the table of percentages is that Europe, which has already been shown to have produced 80,154,000 bushels less wheat in 1899 than in 1898, actually produced a greater percentage of the total world's crop in 1899 than in the previous year—55.02 per cent. in 1899 against 54.08 per cent. in 1898. Moreover, if the year 1897 be included in the comparison it is noticeable that the trend of the percentages of the world's crop produced on the European continent in the years 1897, 1898 and 1899 has been in a directly opposite direction from the trend of percentages of production in North America. The European production, which has reached the low point of 51.85 per cent. of the world's crop in 1897, rose in 1898 to 54.08 per cent. and to 55.02 per cent. in 1899; the North American production, on the other hand, which was 26.68 per cent. of the world's crop in 1897, fell in 1898 to 25.96 per cent. and in 1899 to 22.83 per cent. This opposing trend of production, as related to the total world's crop, was, of course, due, in a small degree, to variations in the production of the four other continents.

Europe, it should be remembered, not only produces more than one-half of the world's crop, but consumes almost the entire world's surplus. North America, on the other hand, raises between one-fourth and one-fifth of the world's crop, and is the world's great surplus exporter. Between these two great wheat-producing regions is transacted the bulk of the intercontinental wheat trade of the world. Prices are, therefore, certain to show more or less sensitiveness to changes in the proportions of the world's crop produced on each of these continents, the one an importer from necessity, the other the principal contributor of the world's surplus. In 1897 the exceptionally low proportion of the world's crop produced on the European continent, 51.85 per cent., furnished a substantial basis for an advance in world's prices. The high proportion of the same year's crop produced in North America, 26.68 per cent., gave this continent a controlling position in the situation. But for the slight increase in the percentage of the 1897 world's crop produced in Asia and Australasia, it is evident the North American control would have been practically complete. Since that date a reversal of these conditions in Europe and North America, especially marked in 1899, has probably had some influence in maintaining persistently low prices for wheat in spite of a very marked upward tendency in many other products of agriculture. A second depressing influence upon values has been the important increase in 1898 and 1899 in the percentage of the world's crop produced in South America and Australasia, both active competitors of North America in the markets of importing Europe. But another important influence is the abundance of the rye crop, especially in 1899; for a careful study of the movement of the prices of wheat through a considerable series of years shows that they are materially affected by an abundance or a scarcity of the other great European bread grain.

About 95 per cent. of the wheat crop of the world is produced in the northern hemisphere. Moreover, that half of the globe not only consumes its entire product, but a heavy proportion of the crop of

the southern hemisphere has of late years been transported across the equator from Argentina and Australasia to the European markets.

In years of average production, over 75 per cent. of the wheat crop of the world is produced in the seven principal producing countries of the northern hemisphere. The proportions which each of these seven nations has contributed to the world's supply for the past five years is given in the following table. The countries are arranged in order of their relative importance as producers.

Percentage of world's wheat crop produced in each of the following countries :—

Countries.	1895.	1896.	1897.	1898.	1899.
United States ...	18.01	17.06	23.73	23.11	20.08
Russia ...	17.82	18.12	17.02	17.10	17.88
France ...	13.13	13.16	11.04	12.44	13.43
India ...	9.84	8.21	8.56	8.89	8.53
Austria-Hungary ...	8.11	8.20	5.72	6.47	7.04
Germany ...	4.49	5.01	5.37	4.54	5.19
Italy ...	4.56	5.79	3.89	4.70	5.06
Total ...	75.96	75.55	75.33	77.25	77.21

Of the seven countries enumerated above, three alone—the United States, Russia and India—produce an excess over their own consumptive demands. Austria-Hungary is also an exporter, but on a scale suggested by the low percentage that she produces of the world's crop. France, under the incentive of a high protective tariff on wheat, endeavors, with varying success from year to year, to meet her own consumptive demands. Germany and Italy are importers, the latter an important customer on the Russian markets.—*The Weekly Chronicle*.

IMPROVING PASTURES.

By "AGRED."

It is a commonly expressed notion that stocking improves pastures. Exactly how this improvement occurs is not quite clear: in fact the contrary state of things is the only feasible condition. The growth of grasses and herbage on pasture lands, as well as the growth of farm crops on arable lands, depends upon the quantity and quality of the plant foods in the soil. On unstocked areas, the natural vegetation grows, dies, and decays, and broadly speaking, the balance of fertility is maintained. On stock producing pastures, the natural balance is destroyed. About one-third of the nitrogen, phosphoric acid and potash content of grasses etc., is lost when by animal assimilation the grass is converted into meat. When this drain on the soil is constant, and no replacement of fertility is made, it is logically certain that the day must come when pastures so treated will gradually deteriorate and eventually run out. While travelling through the South West, about two years ago, the present writer heard from several farmers of the old established variety, that the grasses were neither so luxuriant nor of such enduring quality as in the days of yore. Yet it had apparently not occurred to these men that the

continued production of beef or mutton, milk or wool, from natural grasses might defertilise their land as well as the continued production of wheat. The replacing of pasture plant food by artificial applications, has not, to writer's knowledge, been attempted in this colony. English farmers have long practised it, with as satisfactory results as on their arable lands. Of course, it by no means necessarily follows that such would therefore be profitable under local conditions, but it would seem, by a comparison of our values of staple products with those obtaining in England, that some experiments on this subject would be interesting. There are two methods by which fresh fertility may be given to pastures, by direct application of fertilisers, or by giving the animals grazing thereon an additional diet of some rich food, which will give to the manure a greater value. Considering the comparatively high cost of artificial fertilisers, the latter system is probably more likely to meet present needs than the other, more especially since it would at the same time improve the class of animals produced in the colony. The former system requires more capital and shows its beneficial results more rapidly than the latter, but on the other hand, the latter is generally followed by profitable results on the foods used over and above their additional manurial value. While it is true that the manures principally employed in England for pasture improvement, viz., phosphate powder and superphosphate, are considerably and relatively cheaper than with us, yet there are compensating influences, of which perhaps a kindlier climate is the most important, that reduce the cost of production here. The matter, however, resolves itself into a question of £ s. d., and would be best answered by actual experiment under suitable conditions.

It may be worth mentioning that under some conditions, stocking does improve pasture. As an instance of these exceptional cases, goat stocking on scrubby lands is a case in point. The goat is a browsing animal and only eats grass occasionally. By the constant nibbling by the goats, scrubs are kept in check, while the manurial excreta of the animals go to develop and improve the scrub-checked grasses. The Angora goat has been used in portions of America, with the most marked success for this purpose, and happily with monetary gain in the meantime.

The explanation of this popular fallacy is probably found in the fact that around farmsteads and other places where stock are wont to congregate the pastures are noticeable improved, but this is simply due to the concentration of the manure on these favored spots, and the extra growth is obtained at the expense of the other parts grazed by the stock.

THE WINE TRADE.

At a meeting of the Winegrowers' Association, held in Adelaide on May 30, Mr. T. Hardy read a paper on the prospects of the wine trade, from which the following is an extract:—"I have been asked by your president to give a paper on some subject connected with vine-growing or wine-making, and have chosen the

subject of the future of the wine trade, as likely to give rise to a good discussion. The three short vintages we have had in succession have greatly reduced the stocks of wine on hand. It is said, on competent authority, that the figures stand as follows:—At the end of 1898 vintage, 4,700,000 gallons; 1899, 3,900,000 gallons; 1900, 2,600,000 gallons. Those for 1898 and 1899 are from official returns; that for the present year is estimated. The stocks of wine suitable for early shipment to England are now mostly in the cellars of a few of the larger exporters, and very little is left of the 1899 vintage in the hands of the smaller winemakers. There is some reason to fear that the supply of suitable wine for the London market for the next few years will run short of the requirements of the trade, which, if continued to be carried on by such able and energetic firms as at present, will be an ever-increasing one. Unfortunately we are not alone, for the stocks of wine in Victoria good enough for the London trade are very low, and the past vintage was almost a failure in many districts of that colony. With the near advent of free ports for our wines into the other colonies, a very largely increased market will be opened up, which will increase from year to year. Our home trade is well known to those engaged in it to be extending steadily and surely owing, no doubt, largely to the good quality of the wines and the low price at which they are retailed. Of course, the immediate effect of shortened stocks will be that younger wines will be exported and put on the market, and this will, to some extent, tide over the difficulty for a time, provided they are sufficiently matured before shipment, and we may hope that one or two really good vintages will follow the bad ones, for it would be a national calamity if the English trade were hampered by insufficient supplies of wine from Australia, a trade which has been so ably created and extended by those engaged in it in London. The question arises—how can we augment the available supplies in the near future? The inspection of vineyards now in progress has shown that not less than 150 acres of vines in the County of Adelaide have been allowed to go out of cultivation, the greater part of which could again be brought into bearing in a year or two. A still larger area of small vineyards, which, owing to the low prices paid for grapes by the winemakers, have been allowed to become unproductive, could, by improved cultivation and the use of manures, be made to give greatly increased crops of grapes. In some of the largest vinegrowing districts, not yet inspected, there are no doubt hundreds of acres of vines in the same condition. The supply of good, sound wines, suitable for export, may be considerably increased by the smaller winemakers adopting the improved methods of fermentation now in use by the leading ones in the business. Even after all that can be done to increase the production of the existing vineyards, unless planting new vineyards is immediately entered upon, the supply of wine for future requirements must, in a few years, fall far short of keeping pace with the increased demand.”

HATCHING AND RAISING TURKEYS.

LET HENS HATCH THE FIRST LITTER AND TURKEYS THE SECOND.

Prize essay by E. D. Webster in *Orange Judd Farmer*: It is advisable that turkey hens should lay somewhere near the buildings, and it is not difficult to persuade them to make their nests where they are wanted. In the first place keep the turkeys tame. Do not drive them away every time one comes within a rod of the shed or stable, and never allow the children or dogs to chase and frighten them. But, no matter how tame they may be, they will hide their nests, for it is their nature; but if they have a chance they will hide them around the buildings. An old barrel turned on the side in a fence corner and partially covered with brush, a few boards and brush fixed around an old stump, and other arrangements of a like nature seem to suit turkeys.

Don't let the eggs become chilled: remove them from the nest every day, leaving a wooden or china nest egg. When the eggs are removed from the nest as fast as laid the hen will frequently lay thirty or more eggs before she takes a notion to sit; but when the eggs are all left in the nest the turkey will usually begin to sit when she has from fifteen to twenty eggs. Always set the first litter under hens. As a general thing hens make the best mothers; but we usually let the turkey hens sit on the second litter, and with care they make good mothers. A good deal of the success in hatching turkey eggs with hen mothers depends upon the nest. When turkey eggs are set high and dry in one corner of the hay loft, or in a box or barrel with only a handful of hay in the bottom, the chances of their hatching are exceedingly slim. If you set turkey eggs under hens borrow a hint from the old turkey and make the nest on the ground wherever practicable; otherwise put a sod in the nest box or barrel, hollow it out just enough to keep the eggs in and cover lightly with hay or leaves, and take the same precautions against hatching lice instead of turkeys that have been prescribed in these columns before. During the last two weeks of incubation sprinkle the eggs every other day, while the hen is off, with water that has had the chill taken off. The object of this is not, as many seem to think, to soften the shell so as to enable the young to get out, but to prevent the contents of the shell from drying up. A certain amount of moisture is necessary to hatch turkey eggs, and when they are set on the ground the moisture is supplied naturally, but when you go back on nature and set the eggs in a box you must supply the moisture artificially.

When the young turkeys appear in the outer world, don't go poking around and lifting up the old hen to see how many eggs are hatched, but restrain your desire to count your turkeys and let them alone for at least twenty-four hours. They will not require food during that time, and as they are very delicate when first hatched, it is best to avoid handling them until they become strong on their legs, then remove them with the mother hen to the coop and pen.,

which should be all ready for the occupants. Proper coops and pens for the young turkeys until they are fully feathered are absolutely necessary to protect them from rains and heavy dews.

To make a pen, take four boards two feet wide and sixteen feet long, place them edgewise in the form of a square, holding them in place by driving stakes in the ground on each side of the boards. Place the coop in the pen. I prefer a coop without a floor, so it can be moved to a fresh spot every day, but if you have any doubts about being able to keep the young turkeys dry and comfortable during a rainy spell, you had better put in a board floor and cover with gravel or sand, which should be renewed as often as every other day. When the mother turkey is left to herself she chooses a new resting place every night, and when you confine them in a coop you must imitate her example by moving or cleaning the coop often.

PECULIAR DISEASE IN SHEEP

Mr. J. D. Stewart, Government Veterinary Surgeon, N.S.W., has submitted an interim report on a peculiar disease occurring among sheep in the Narrabri district, N.S.W., known as "staggers" or "shivers." The following is an extract:—

"The disease has been noticed in this district for some time. During the past two years, it has been more and more prevalent, until at the present time it may be said to be fairly common. The disease affects all sheep from four months old upwards. Sheep in prime condition appear to take the disease more readily than those in fair or low condition.

"Out of about 500 sheep inspected while they were in the fold, where they had been resting for some two or three hours, only three were picked out as other than healthy. These three sheep attracted special attention by the stiff manner in which they walked. Otherwise they were apparently healthy. On the flock being released from the fold, every one of the sheep came out lively and apparently full of vigor. But before they had been driven 200 yards, the three sheep noticed amiss in the fold began to tail out, and walk in a peculiar stiff manner, with back arched and nose poked out. They were soon joined by other sheep, also showing these premonitory symptoms. After driving the flock for half a mile, about 2 per cent. showed evidence of being affected with the disease. On an attempt being made to further drive any one of the sheep that showed the above symptoms, the animal, after going a short distance, throws itself down in an exhausted condition. The exhaustion is not then complete, for if further urged, the sheep will rise and travel another short distance, and then go down again. If allowed to rest thoroughly after they first go down, the sheep will get up and walk a considerable distance, provided they are not interfered with. On the other hand, if the sheep are urged on, as soon as they go down, and are hustled about, the distance covered at each attempt becomes less and less, until they throw themselves on the ground, and absolutely refuse to go further until rested. If they are now put on their feet, a trembling or shivering of the muscles of the legs occurs, hence the disease is

known locally as 'shivers' or 'staggers.' When the sheep are in this extreme stage the following symptoms are observed, e.g., temperature high, 105 deg. to 108 deg. F.; breathing hurried, about 100 per minute, pulse weak and rapid, reaching to 140 per minute; mucous membrane of mouth blanched—although the skin retains its pinkish hue. No pain is evinced on palpitation being practised over the chest or abdomen. The legs are perfectly mobile and muscles supple. The feet carry good, sound horn, and are perfectly cool. On auscultating the chest, loud crepitus is heard, but no irregularity in the heart's action is detectable. There is no evidence of pain. Neither can the other extreme condition, paralysis, be said to exist, as the sheep, after a rest, move freely, and can jump over logs.

"The condition appears to be one of temporary prostration, attended by high temperature, weakness of the heart's action, and difficulty in breathing. With rest, these symptoms pass off. If rest is not allowed, and the sheep are further harassed, they die.

"From the clinical aspect and post-mortem appearances of this disease, it will be seen to differ from any of the diseases hitherto reported, as having affected sheep in this colony, such as anthrax, black-leg, liver-rot, etc. The disease does not appear to have any serious deleterious effect on the mutton of the sheep that have recently recovered.

"A definite diagnosis cannot be arrived at until the investigation is carried further, and with a view of ascertaining whether this disease is caused by micro-organisms, cover-glass preparations were made of the blood, and of fluids from the tissues of the spleen, liver, heart, and kidneys for bacteriological examination. Culture tubes were also inoculated from the spleen and with blood of affected animals. In order to determine whether the disease is due to degeneration not visible to the unaided eye of some of the important structures or organs, portions of the brain, spinal cord, heart, lungs, liver, spleen, kidneys, and muscle were carefully preserved for histological examination.

"As marsh mallow forms the principal food of the affected sheep, arrangements have been made for Mr. Guthrie, analytical chemist to the department, to chemically examine this plant, to ascertain whether it is deficient of some of the ingredients of food essential for the building up of healthy tissue. This herb is known to contain an alkaloid, but it has not yet been ascertained whether this alkaloid is of a toxic nature."

RESTORING FERTILITY TO SANDY LAND.

LOCKWOOD MYRICK, NEW JERSEY.

Fertilisers for very light land should contain an unusually large percentage of nitrogen to produce the best results. Such soils are usually leachy, and the loss of soluble nitrogen through washing is very large in fall and winter, especially if the land is not protected by snow. Consequently, such lands are exceptionally poor in nitrogen, and it becomes by far the most essential element, the addition of phosphoric acid and potash being of much less consequence. At least this is the general experience on the very light soils of southern New Jersey.

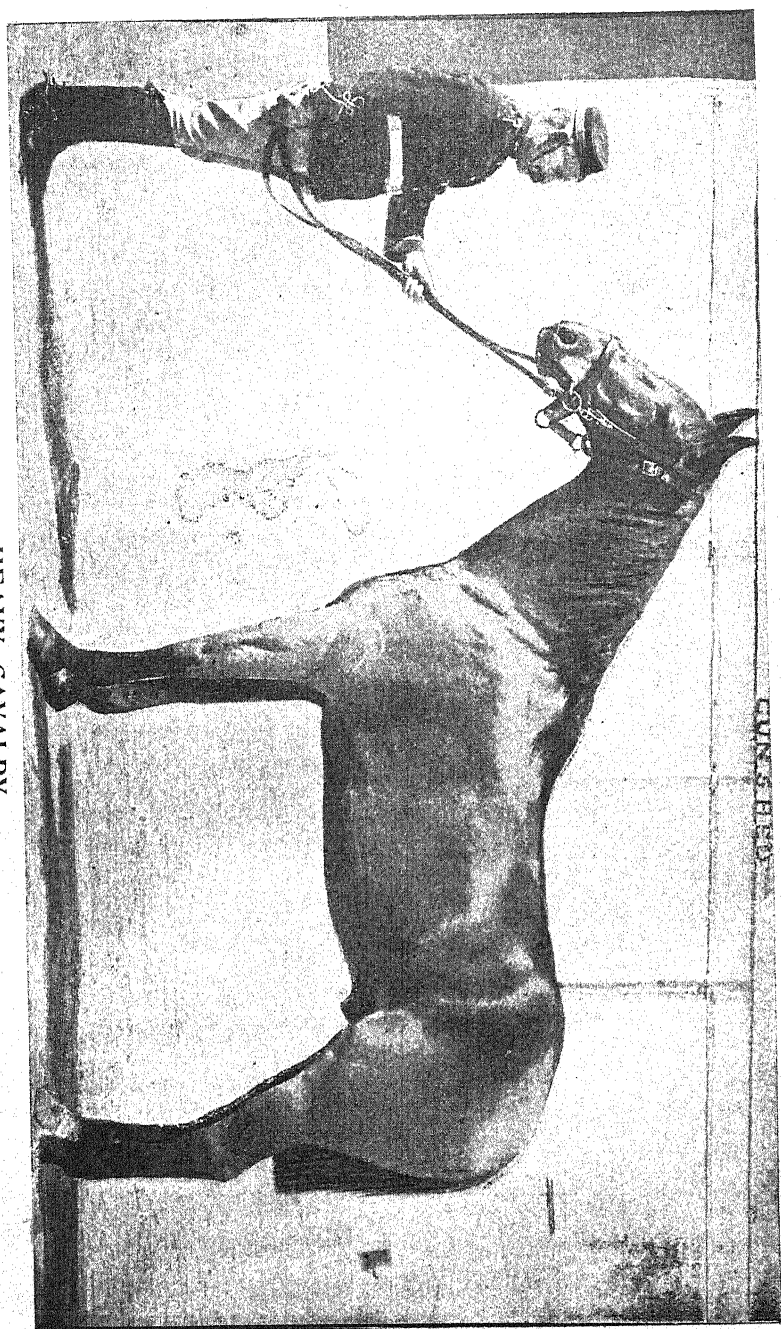
Fish seems to possess some peculiar quality that makes it excel on this class of soils, at least for a time, but tankage, ground meat, blood, etc., do not give corresponding results. Nitrate of soda does well on these soils, but it must be applied several times in small doses, or much of it will be lost through leaching.

Cottonseed meal acts very well, and where it can be got is a good substitute for fish. It contains less nitrogen, but has considerable potash. A good grade of fish contains about 8 per cent. nitrogen (say 10 per cent. ammonia), and about 5 or 6 per cent. phosphoric acid. On sandy land the decomposition of fish seems to go on quite uniformly, so that the crop is nourished throughout the season, while very little remains undecomposed at the end of the season unless an unusually large quantity has been applied.

After a year or two of fertilising such lands with fish, muriate of potash can be applied to make good the loss of potash. How often and how large dressings of muriate are required depends on the land and how it has been cropped. It would be a better plan to apply both fish and potash at once, and in some sections this is a popular fertiliser, but it is possible to grow a crop without adding potash, while it is almost impossible to do so without nitrogen. Under this method land does not improve, but it is possible to grow crops on soils that would otherwise be worthless.

The exhaustive effect of applying fish is much influenced by the amount of organic matter in the soil. If crops of cowpeas or rye have been ploughed under and the soil fairly well supplied with vegetable matter, there is much less drain on the soil from using fish alone than when the land is deficient in such organic matter. On such land it is possible to grow good corn, while on very thin, sandy land it is sometimes impossible to make corn even when fish is applied in large quantities.

The leaching effect of winter rains can be largely prevented by growing winter rye, which not only prevents the loss of nitrogen through percolation, but adds organic matter when it is ploughed under in the spring. Rye is by far the surest crop for this purpose, but crimson clover would be better if it were reliable. It is difficult to make crimson clover grow on very sandy land in south Jersey, apparently because of the drying of the young sprouting plants. But with rye and fish it is quite possible to make respectable crops of corn. Then by growing cowpeas (with acid phosphate) for green manuring the soil fertility can be increased with little expense, apart from losing the use of the land for a summer. A sandy land section gives an impression of undue poverty because of the lack of grass, but when sandy soils are intelligently fertilised and are put in crops adapted to the land, they become valuable and in some instances yield greater financial profits than the heavier grass-growing soils. One has to unlearn about all he knows of farming on heavy soils when he farms these light lands. There is much sandy plain land in the Middle and New England States, as well as farther south, that probably would pay to work if farmed according to the practice that has proven profitable on New Jersey's sandy land.—*American Agriculturist*



HEAVY CAVALRY.

MARKET REPORT.

FOR WEEK ENDING JULY 12TH.

The West Australian General Produce Co. report sales effected for the following articles on account of various consignees, for the month ending July 12th, 1900:—Sales during the past four weeks have been well attended, purchasers operating slightly in excess than for immediate requirement, mostly caused through general advance in values of farm produce. Bacon, consignment of sides, also some very mild sugar cured flitches, were cleared at satisfactory prices, the demand being for medium streaky sides. Butter has been very unsteady, with a slight fall up to the present. Local butter is sought after and prime quality would find ready sale. Lard, good supplies to hand, medium outlet. Cheese, mild, rich, loaf size only in demand, sales moderate. Eggs, local, fresh, find good sale. Potatoes, imported lots have fallen off lately and are very scarce on spot, and values F.O.B. much higher; local, newly dug, are coming in more freely, being much preferred to the imported, and are fetching satisfactory prices. Chaff, local is scarce and the market is now depending mostly on the imported article; onions not over plentiful, owing to their growing condition importers do not care to venture large consignments; bran and pollard, slight increase in value; flour, local is finding great favour with bakers, and those who do not use it solely have to mix it with the imported, price has risen steadily during the past few weeks owing to the higher tone of the wheat market in the Australian Colonies and the home market; oats, N.Z., as anticipated, have risen, and the telegraphic report which we received from our agent has been confirmed; wheat has firmed considerably and a further rise is expected. Local fruit, such as oranges, mandarins, passion fruit and all other fruit in season find a ready outlet; poultry, the demand mostly is for young full grown table birds, ducks are very scarce and, as will be seen in our report, are fetching high prices; vegetables, in good demand, and cabbage, Swede turnips, and pumpkins are much in demand; pork, prime, well dressed from 50lb to 100lb are much enquired for and are bringing such prices as ought to encourage farmers in pig breeding, not much demand for suckers; kangaroo meat has a steady sale; bone dust and artificial manures, demand easing between season. Farm and Dairy Produce—bacon, sides, 9½d, 10d; flitches, 9½d lb; hams, 10½d, 1s, 1s 1d, 1s 1½d to 1s 2d lb; butter, 11d, 1s, 1s 1d to 1s 2d lb; lard, in tins, 9d to 9½d lb; cheese, case lots, 9½d medium 9d lb; eggs, local, 1s 10d to 2s 2d doz; potatoes, imported, £5 10s, £6 to £6 10s; local, £6 to £6 10s; onions, 7s 6d cwt; chaff, £6 10s, £7, £8, £8 10s; hay and straw, £5 10s to £6; bran, £6 15s, £7, £7 10s ton; pollard, £7, £7 5s to £7 10s; Flour, local, £8 12s 6d, £8 15s, £9 7s 6d, £9 10s; 50lb bags, £9, £9 10s to £9 15s; oats, N.Z., 3s 4½d to 3s 6d; maize, whole, 5s 6d to 6s 6d bushel; wheat, 4s 3d, 4s 6d to 4s 9d bushel; oil cake, £7 ton, 7s 6d per 100 lb; peas, dry, 4s 6d to 4s 9d bushel. Fruit—Oranges, local, 8s, 10s to 12s 6d case; lemons, local, 5s, 6s, 7s to 9s case; mandarins, local, 21s, 25s 6d to 28s case; passion fruit, worth 14s, 16 to 20s case; cape gooseberries. 3d to 4d lb; apples, dessert, 16s, 18s, 20s to 26s case; pears, dessert, 18s, 22s 6d, 30s case. Vegetables—Cabbage, 7s, 8s to 11s cwt; cauliflowers. 4s, 6s, 8s, 10s, 16s to 18s doz; carrots, 1s 6d to 2s doz bunches; parsnips, 2s doz bunches; turnips, white, 1s 6d to 2s doz bunches; Sweetes, 6s to 7s 6d cwt; pumpkins, worth £5 10 to £6 ton; rhubarb, 2½d, 3d to 4d lb; egg fruit, 1s 6d doz; capsicums, red, hot, 1s lb. Salads and Herbs—Lettuce, 8d to 1s doz; spring onions, 1s 6d to 2s doz bunches;

beetroot, 1s 6d to 2s doz bunches; celery, 2s to 3s 6d doz heads; cress, worth 31 to 41; thyme, marjorum, sage, mint, off stalk, 6d lb; sweet basil, sweet fennell, 1s 6d lb. Poultry—Fowls, 5s to 6s 6d pair; chickens, unsaleable; ducks, 6s 6d, 7s 6d to 9s 6d pair; geese, 10s pair; turkeys, gobblers, from 18s, to 22s 6d pair; hens, 9s to 14s pair. Game—Kangaroo meat, kangaroo tails 21 to 31 lb. Carcase Meat—Pork, from 60 to 100lb, 6½ to 7d lb; mutton, lamb, beef, veal, live stock preferred. Sundries—Bonedust, £7 to £7 10s ton; phosphate, £1 1½ to £5 10s ton; superphosphate, £6 10s to £7 ton; guano phosphatic, £3 15s to £4 10s ton; guano ammonical, £6 ton; coarse bacon salt, £3 ton; new corn sacks, 7s 6d doz; second hand corn sacks, 4s doz; new bran bags, 4s 7d doz; second hand, 3s doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING JUNE, 1900.

This month was remarkable for the persistence of low barometer readings along the South coast, accompanied by severe storms, heavy rainfall, and warm nights. The barometer at Perth was below 30 from the 7th till the 23rd, during which time a series of undulations in a very extensive area of low pressure swept along the ocean just South of the continent from West to East. The wind during most of this time was blowing hard from between W. and N.W., backing to N. just after the passage of each crest, with a few hours of fine weather. The mean barometer for Perth was the lowest winter one on record, although no remarkably low readings were obtained. The average for previous years is 30.100. The six days, 15th to 20th, were practically wet, the daily records being 265, 72, 101, 42, 4, and 112 points. The 15th was one of the wettest days ever experienced in Perth, the rainfall being heavy and almost continuous—a very unusual characteristic of our climate. Off the S.W. coast the weather was even more severe, heavy gales and tremendous seas being reported, but the casualties were light. The lowest reading recorded at Cape Leenwin was 29.119 on the 21st, and at Breaksea 29.157 on the same date. Towards the end of the month fine, bright, anti-cyclonic weather was experienced. The total rainfall in Perth for the month, 11.21 inches (in the Botanical Gardens), was more than double the average, and was only exceeded in one previous June (12.13 inches in 1879) since records commenced in 1876.

Taking the colony as a whole, we find that throughout the tropics there was about an average rainfall, being in some cases a little in excess, and in others a little behind that for previous years. But everywhere South of the tropics, with a few rather peculiar exceptions, the rainfall has been bounteous and considerably in excess of the previous average. This is especially noticeable, as might be expected, on the South-West coast between Geraldton and Albany, and for 50 or 100 miles inland. Good rains also extended throughout the Murchison and Coolgardie fields, thus continuing to make the season, especially inland, the best that has ever been known.

The temperature curves for the colony are not very different from those for last June, except that the thermometer readings, especially at night, are generally higher throughout. But in barometer curves a great difference is perceptible. Last June the isobar of 30.0 ran just outside the coast line from Wyndham to the Leeuwin, whilst this June it is pushed up beyond the Murchison, and the isobar of 29.8 ran from the Leeuwin to Breaksea Island.

RAINFALL for May, 1900 (completed as far as possible),
and for June, 1900 (principally from Telegraphic Reports).

STATIONS.	MAY.		JUNE.		STATIONS.	MAY.		JUNE.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	59	..	25	..	Tambrey ..	295	3	..	..
6-Mile Hotel ..	70	4	53	1	Millstream ..	..	..	..	..
Carlton ..	..	..	..	..	Hong Kong ..	45	1	..	..
Denham ..	..	..	..	..	Whim Creek ..	59	4	156	5
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	245	4	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	..	..	..	..
Lisadell ..	..	..	..	..	Balla Balla ..	16	3	77	2
Turkey Creek ..	44	2	10	2	Roebourne ..	67	2	67	5
Ord River ..	..	..	..	..	Cossack ..	80	2	114	..
Koojubrin ..	..	..	..	..	Fortescue ..	633	3	89	6
Hall's Creek ..	79	..	14	..	Mardie ..	628	3	..	..
Flora Valley ..	..	..	..	..	Mt. Stewart ..	176	3	..	..
Ruby Creek ..	..	..	..	..	Yarraloola ..	..	..	..	..
Denison Downs ..	..	..	..	..	Chinginarra ..	728	3	..	..
					Onslow ..	1020	4	204	7
WEST KIMBERLEY:					Peedamullah ..	545	3	..	..
Obagama ..	..	..	..	..	Clifton Downs ..	..	..	..	..
Derby ..	30	1	90	..	Red Hill ..	395	3	..	..
Yeeda ..	46	1	62	3	Mt. Mortimer ..	..	..	..	..
Liveringa ..	..	..	..	..	Wogoola ..	..	..	..	..
Mt. Anderson ..	..	..	..	..	Nanutarra ..	209	2	..	..
Leopold Downs ..	..	..	..	..	Yanrey ..	140	2	..	..
Fitzroy Crossing ..	113	2	6	1	Point Cloates ..	290	7	..	..
Quanbun ..	..	..	..	..	
Nookanbah ..	..	..	..	..	GASCOYNE:				
Broome ..	113	6	143	..	Winning Pool ..	144	2	399	9
Thangoo ..	..	..	..	..	Towara ..	121	4	..	..
La Grange Bay ..	94	4	93	3	Ullawarra ..	302	2	..	..
					Woorkadjia ..	108	5	..	..
NORTH-WEST:					Thomas P'l'c St'n ..	..	..	..	..
Wallal ..	42	3	68	2	Yanyearreddy ..	226	3	..	..
Condon ..	95	..	74	..	Williambury ..	45	1	..	..
DeGrey River ..	60	2	..	..	Wandagee ..	..	..	..	..
Port Hedland ..	4	1	106	4	Minilya ..	..	..	..	..
Boodarie ..	Nil	..	..	..	Boolathana ..	253	3	..	..
Yule River ..	..	..	..	..	Carnarvon ..	436	4	184	..
Warralong ..	..	..	..	..	Cooralya ..	250	2	..	..
Muccan ..	..	..	..	..	Doorawarra ..	251	2	..	..
Mulgie ..	..	..	..	..	Mungarra ..	240	..	..	..
Eel Creek ..	..	..	..	..	Weenamia ..	..	..	..	..
Coongon ..	..	..	..	..	Errivilla ..	..	..	..	..
Warrawagine ..	..	..	..	..	Dirk Hartog Is. ..	531	9	..	..
Bamboo Creek ..	36	1	80	3	Sharks Bay ..	456	7	262	14
Marble Bar ..	8	1	47	4	Cararang ..	541	10	..	..
Warrawoona ..	32	1	76	5	Meedo ..	217	5	..	..
Corunna Downs ..	..	..	..	..	Wooramel ..	347	5	346	13
Nullagine ..	24	2	43	..	Hamelin Pool ..	316	7	182	..
Tambourah ..	12	1	70	3	Byro ..	266	6	..	..
Mulga Downs ..	140	2	..	..	Beringarra ..	176	2	..	..
Mt. Florence ..	..	..	..	..	Mt. Gould ..	179	2	..	..

RAINFALL.—Continued.

STATIONS.	MAY.		JUNE.		STATIONS.	MAY.		JUNE.	
	No. of points 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.		No. of points, 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					SOUTH-WEST DIVI-				
Peak Hill ..	102	6	431	..	SION, CENTRAL				
Abbotts ..	88	4	333	14	(COASTAL):				
Mileura ..	170	3	..	..	Gingin ..	455	8	1244	22
Milly Milly ..	246	4	..	..	Belvoir ..	311	6	942	22
Manfred ..	264	5	..	..	Guildford ..	295	7	1099	19
Boolardy ..	246	3	..	..	Canning Timber				
Wooleane ..	350	..	..	..	Mills ..	411	8	1336	22
Dairy Creek ..	589	5	..	..	Canning Water-				
Murgoo ..	407	6	312	12	works ..	132	5	1177	24
Nannine ..	50	1	277	..	Perth Gardens ..	291	7	1121	23
Star of the East	80	..	..	..	„ Observatory ..	307	8	1119	23
Annean ..	128	3	..	..	Subiaco ..	291	8	1142	23
Tuckanarra ..	166	4	272	11	Claremont ..	356	8	1034	24
Coodardy ..	310	4	339	11	„ (Richardson)	311	7	917	20
Cue ..	408	5	366	14	Fremantle ..	307	8	718	24
Day Dawn ..	361	3	327	12	Rottneet ..	312	7	768	24
Lake Austin ..	325	5	272	17	Rockingham ..	321	8	753	19
Lemmonville ..	..	..	308	12	Jarrahdale ..	335	7	1445	25
Mt. Magnet ..	376	7	237	13	Mandurah ..	540	8	920	23
Challa ..	210	3	..	..	Pinjarrah ..	463	7	1395	23
Youeragabbie ..	394	7	..	..	Harvey ..	338	7	1458	25
Yalgoo ..	441	7	297	..					
Gabyon ..	334	8	368	12	SOUTH-WEST, CEN-				
Gullewa ..	357	8	399	18	TRAL PART (IN-				
					LAND):				
SOUTH-WEST DIVI-					Goomalling ..	493	4	441	13
SION (N'N PART):					Culham ..	326	7	681	21
Murchison House	415	9	..	..	Newcastle ..	246	8	796	19
Mt. View ..	415	8	535	24	Eumalga ..	285	6	672	21
Yuin ..	473	7	..	..	Northam ..	232	7	400	19
Northampton ..	444	6	946	17	Grass Valley ..	174	6	517	18
Mt. Erin ..	453	8	..	..	Meckering ..	205	4	..	..
Oakabella ..	465	6	..	..	Doongin ..	293	7	..	..
Narra Tarra ..	419	7	..	..	White Raven ..	174	6	..	..
Mullewa ..	..	..	355	9	Sunset Hill ..	166	6	456	20
Bootenal ..	321	6	..	..	Cobham ..	230	8	624	22
Geraldton ..	387	8	560	..	York ..	229	8	606	21
Greenough ..	508	..	824	..	Beverley ..	176	7	548	15
Dongara ..	276	7	661	23	Barrington ..	166	6	482	21
Dongara (Pearse)	272	8	673	21	Sunning Hill ..	140	6	..	..
Minginev ..	305	8	749	22	Wandering ..	236	8	1098	21
Rothsay ..	305	9	404	21	Pingelly ..	175	8	526	17
Field's Find ..	479	17	346	13	Marradong ..	210	7	913	21
Carnamah ..	319	8	705	21	Bannister ..	229	7	948	20
Watheroo ..	246	8	617	21	Narrogin ..	217	7	525	21
Dandaragan ..	352	7	720	24	Wickepin ..	146	9	592	25
Moora ..	284	8	587	23					
Yatheroo ..	378	7	..	..	SOUTH-WEST DIVI-				
Walebing ..	299	8	688	24	SION (S'N PART):				
New Norcia ..	366	8	812	24	Bunbury ..	373	8	1216	24

RAINFALL.—Continued.

STATIONS.	MAY.		JUNE.		STATION.	MAY.		JUNE.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Collie Saw Mills	419	9	1385	23	—Continued.	..	..	174	9
Donny Brook ..	...	...	866	20	Mt. Malcolm ..	75	7	155	10
Boyanup ..	387	8	1097	23	Mt. Morgan ..	32	4	283	11
Busselton ..	307	9	948	26	Laverton ..	82	5	214	14
Quindalup ..	437	8	899	20	Murrin Murrin ..	94	4	203	7
Margaret River ..	553	10	1164	27	Pendennie ..	..	..	324	10
Lower Blackwood ..	332	9	1119	23	Tampa ..	..	..	325	8
Karridale ..	478	16	1155	28	Niagara ..	114	4	..	..
Augusta ..	..	..	..	..	Edjudina ..	182	6	..	..
Cape Leeuwin ..	393	16	1061	29	Yerilla ..	..	..	351	10
The Warren ..	441	9	1346	24	Menzies ..	190	6	233	10
Lake Muir ..	..	..	..	..	Goongarrie ..	160	5	189	9
Riverside ..	247	10	..	..	Kurawa ..	136	7	188	13
Balbarup ..	292	12	914	22	Gladiator Mine ..	157	6	193	13
Mandalup ..	295	5	..	..	Kurnalpi ..	173	8	224	9
Bridgetown ..	332	12	1139	26	Bulong ..	175	7	139	10
Greenbushes ..	357	..	1242	24	Kanowna ..	164	9	174	14
Williams ..	182	7	769	20	Kalgoorlie ..	179	8	192	13
Arthur ..	145	8	604	23	Coolgardie ..	172	7	94	..
Darkan ..	117	7	626	16	Londonderry ..	162	8	144	17
Wagin ..	202	10	512	26	Widgiemooltha ..	216	7	65	6
Glencove ..	278	9	481	20	50-Mile Tank ..	191	7	91	10
Dyiliabing ..	222	10	388	18	Norseman ..	153	6	109	7
Katanning ..	209	10	439	23	Woolgangie ..	215	6	112	12
Kojonup ..	169	10	535	20	Boorabbin ..	192	6	108	9
Broomehill ..	165	9	396	16	Karalee ..	266	5	..	..
Sunnyside ..	173	11	382	20	Yellowdine ..	233	6	99	5
Woodyarrup ..	201	12	363	19	Southern Cross ..	224	6	129	12
Cranbrook ..	157	10	432	22	Mount Jackson ..	232	7	221	14
Blackwattle ..	275	14	..	..	Bodallin ..	..	..	117	..
Mt. Barker ..	228	12	417	20	Burracoppin ..	208	6	245	17
St. Werburgh's ..	293	16	..	..	Kellerberrin ..	278	8	298	16
Forest Hill ..	312	18	598	27	Mangowine ..	253	6	..	..
Denmark ..	711	..	906	..	Waltoning ..	395	5	..	..
Albany ..	477	17	673	25	EUCLA DIVISION:				
Point King ..	402	14	738	25	Coconarup ..	179	8	..	..
Breaksea ..	413	15	524	25	Fanny's Cove ..	372	11	..	..
Cape Riche ..	472	10	..	..	Park Farm ..	355	8	..	..
Pallinup ..	165	10	344	16	Esperance ..	349	13	415	..
Bremer Bay ..	425	12	185	12	Gibson's Soak ..	402	10	220	7
Jarramongup ..	196	10	..	..	30-Mile Condenser ..	351	6	..	..
EASTERN DIVISION:					Swan Lagoon ..	278	13	..	..
Lake Way ..	184	5	..	..	Grass Patch ..	283	11	116	15
Lawlers ..	54	5	201	13	Lynburn ..	226	11	..	..
Lake Darlöt ..	..	..	..	..	Israelite Bay ..	164	7	71	10
Diorite King ..	104	8	202	11	Balladonia ..	50	4	124	8
Sturt Meadows ..	158	7	..	..	Eyre ..	158	..	240	..
Mt Leonora ..	112	6	245	11	Eucla ..	197	13	189	10

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF JUNE, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of											
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.
FREMANTLE	10	13	1944	1944	..	..	4	1944	..	814	..	..	..	49	..	609	100	..	..	..
ALBANY	8	8	500	181	10	..	..	197	..	71	..	..	..	13	..	79	10	..	..	..
GERALDTON	1	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
RUSSELLTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	19	22	2145	2126	19	..	4	2141	..	893	..	..	..	62	..	970	200	..	..	..
																				1

DEPARTMENT OF AGRICULTURE,
6th July, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE

MONTH OF JUNE, 1900.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.													All Other Trees.		
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.		Small Fruits.	Vine Cuttings.
FREMANTLE ..	16	28	42424	28	42424	..	42424	141	2888	400	15241	1281	164	88	136	..	355	5519	3848	2042	2831	6311	..	1582
ALBANY ..	6	8	6870	8	6870	..	6870	97	166	13	4535	136	204	40	123	..	37	178	349	910	297	21	..	270
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	22	36	49294	31	49294	..	49294	178	2754	413	10776	1417	368	128	250	..	392	5697	4157	4022	2628	4551	..	1852

DEPARTMENT OF AGRICULTURE

6th July, 1900.

AGRICULTURAL SOCIETIES.

SOCIETY	SECRETARY.
Albany and King River Settlers' Association ..	R. H. Playne, King River
Albany and District Settlers' Association ..	J. Mowforth, Albany
Albany Agricultural and Horticultural Society ..	T. P. Haddley, Albany
Brunswick Farmers' Association ..	John Partridge, Brunswick
Boyanup Farmers' and Progress Association ..	W. Eccleston, Boyanup
Beverley Agricultural Society ..	G. E. H. House, Beverley
Cookernup Farmers' Progress Association ..	John McEwin, Cookernup
Coogee Agricultural and Horticultural Society ..	W. H. Allen, Stockdale, Coogee Lake
Drakesbrook Agricultural Association ..	John Sutton, Drakesbrook
Deepdale Farmers' and Fruitgrowers' Assn. ..	J. W. Eakins, Toodyay
Donnybrook Progress Association ..	H. Mead, Donnybrook
Darling Range Vine and Fruitgrowers' Assn. ..	C. J. Wilkerson, Goos bry Hill
Esperance Agricultural, Horticultural and Floricultural Society ..	F. E. Daws, Esperance
Ferguson Farmers' Progress Association ..	Ephraim Gardiner, Ferguson
Greenough Farmers' Association ..	C. W. Sims, Walkaway
Goomalling Farmers' Club ..	R. M. Eaton Goomalling
Geraldton Agri. and Horticultural Society ..	W. J. Cope, Geraldton
Greenhills Farmers' Club ..	James McManus, Irishtown
Greenough Farmers' Club ..	Arthur Clinch, Greenough
Great Southern Pastoral and Agricultural Districts Society ..	W. E. Keetley, Broomehill
Harvey Farmers' Club ..	Gervase Clifton, Harvey
Harvey Agricultural Alliance ..	Kenneth Gibsone, Harvey
Irwin Districts Agricultural Society ..	F. Waldeck, "Bonniefield," Dongarra
Jandakot Agricultural Society ..	H. Warthwyke, Beaconsfield
Jurakine Agricultural Society ..	W. Hayward, Jurakine
Jennapullen Agricultural Society ..	A. C. Morrell, Jennapullen
Kelmscott and Armadale Agricultural Society ..	H. S. Davis, Kelmscott
Kojonup Agricultural Society ..	J. M. Flanagan, Kojonup
Mt. Barker & District Settlers' Association ..	John Morgan, Mt. Barker
Murray Farmers & Fruitgrowers' Co-operative Association ..	Ernest Fawcett, Pinjarrah
Murray Horticultural Society ..	Mrs. E. A. A. Fawcett, Pinjarrah
Moora Farmers' Progress Association ..	George Bishop, Moora
Narrogin-Cuballing Agricultural Alliance ..	W. H. Ingram, Narrogin
Newcastle Branch Bureau ..	W. A. Demasson, Newcastle
Nelson Branch Bureau ..	R. C. Williams, Bridgetown
Nelson Agricultural Society ..	R. C. Williams, Bridgetown
Newtown Progress Association ..	T. A. Thurkle, Woodlands, Vasse
Northam Agricultural Society ..	A. Scott, Northam
Pingelly Agricultural Society ..	J. Bert Taylor, Pingelly
Quindalup Progress Association ..	W. E. Carter, Busselton
Royal Agricultural Society of W. A. ..	Theo. R. Lowe, Perth
Southern Districts Agricultural Society ..	A. R. Pries, Busselton
Toodyay Vine and Fruitgrowers' Association ..	W. A. Demasson, Newcastle
Toodyay Agricultural Society ..	E. G. Hasson, Newcastle

SOCIETY.	SECRETARY.
Thomson's Brook Progress Association ..	C. J. B. Fowler, Thomson's Brook
Upper Blackwood Vigilance Committee and Agricultural Society ..	A. S. Cailes, Upper Blackwood
Upper Preston Progress Association ..	W. Jackson, Preston
Victoria Plains Farmers' Association ..	R. A. Stanwell, Berkshire Villy.
Wonnerup Progress Association ..	P. S. Brockman, 'Reinscourt,' Busselton
Wellington Agricultural and Pastoral Society	W. S. Hales, Bunbury
Wongamine Farmers' Club ..	G. W. B. Smith, Wongamine
West Coolup Branch Bureau ..	A. Anderson, West Coolup
Wandering Districts Agricultural Society ..	S. R. Watts, Papanying Pool, via Pingelly
Walliabup Progress and Horticultural Assn.	F. G. Nicolay, c/o John & Cleary, High-street, Fremantle
Waigerup Agricultural Hall Association ..	G. Smith, Waigerup
Wagin-Arthur Agricultural Alliance ..	O. R. Taylor, Wagin
Williams Agricultural Society ..	Chas. H. Maclean, Williams.

Secretaries of Societies will please be good enough to notify at once any alterations or corrections





JOURNAL

OF THE

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OF

WESTERN AUSTRALIA.

AUGUST, 1900.

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1900

NOTES.

PRIZE FOR BEST BARLEY.—The Swan Brewery Company, Limited, Perth, will give two prizes—£10 and £5 to the growers who send in to it the best dressed and screened lots of barley, which they purchase during next season; the total delivery for the £10 prize to be not less than 50 bags, and for the £5 prize not less than 25 bags. The points considered will be: Freedom from broken, damaged, and skinned corns, caused by thrashing; freedom from thin corn, other kinds of grain, seeds, and other matters. The awards will be given on the whole of the barley from each grower, not necessarily on one particular delivery.

SALE OF AGRICULTURAL SEEDS IN ENGLAND.—A departmental committee has been appointed to inquire into the conditions under which agricultural seeds are at present sold, and to report whether any further measures can, with advantage, be taken to secure the maintenance of adequate standards of purity, and germinating power. The committee consists of the following members, viz.:—The Earl of Onslow, G.C.M.G., chairman; Sir W. F. Thiselton-Dyer, K.C.M.G., C.I.E.; Sir Jacob Wilson; Mr. R. A. Anderson, secretary to the Irish Agricultural Organisation Society; Mr. R. Stratton; Mr. Martin I. Sutton; Mr. James Watt and Mr. David Wilson. Mr. A. E. Brooke-Hunt, of the Board of Agriculture, will act as secretary to the committee.

CLEANING THE PLOUGH.—A good plan for cleaning the plough, which will also work well on other tools of iron or steel, is as follows:—Slowly add one pint of sulphuric acid to one quart of water, handling it carefully and stirring slowly, as considerable heat will result from the mixing. When cool moisten the surface of the metal with this, and then rub dry, after which wash off with pure water. This application should clean any surface not too badly rusted, but if the tool has been long neglected it may require more than one application. After cleaning, a thorough coating of grease is given before putting a tool away, and when taken out to use give another greasing, and it will go one horse easier. Not only is it much easier for team but ploughman also.

DESTROYING TREES TO AVOID FUMIGATION.—The *Weekly Times*, San Francisco, of June 15, says:—Hundreds of orange trees in the western part of the city are being cut down. Householders are sacrificing their trees to avoid complying with the fumigation regulations of the Horticultural Commissioners. The Commission is making a crusade against the scale pest and serving notice on the owners of all affected trees to fumigate. In order to ascertain the state of trees a house-to-house canvas is being made. It costs about 75 cents a tree for fumigation, and an orange tree growing in a city back yard is not worth the money. As a usual thing the Commission finds some one who will cut down the trees for the wood, thus saving the owners as much trouble as possible.

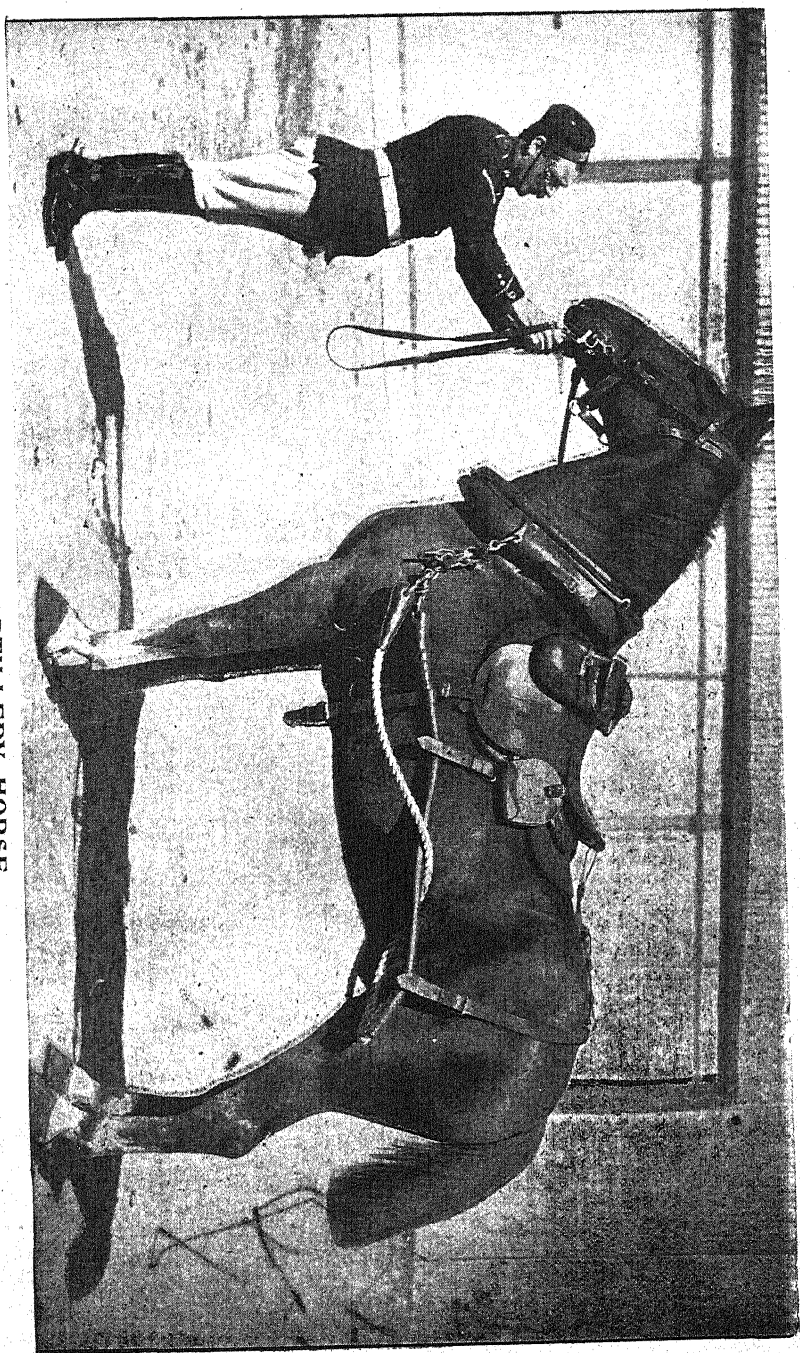


FIG. 6—ARTILLERY HORSE.

In case the householder refuses after a reasonable time to have the trees fumigated the Commission has the right to have their work done and charged to the owners, such charges becoming a lien against the property. The Commission does not require the work to be done immediately. The scale are now in the egg state. Fumigation should begin about August 1st (autumn).

GUM OF THE CHRISTMAS TREE.—Early in May, Mr. C. Harper, M.L.A., forwarded a sample of gum from the Christmas tree to the Department of Agriculture for analysis, with a view to discovering whether or not the gum was useful for the manufacture of india-rubber, or if it possessed any value for commercial purposes. The sample was sent to Mr. S. S. Dougall, Government Analyst, who has forwarded the following report:—Analysis: Moisture, 14.6564; fat and wax, .2818; resinous matter, .0970; saccharine matter, none; arabin, 15.63; metarabin, 67.6431; dextrin, trace; ash, 2.09. The gum is not worth collecting for india-rubber. The sample of gum is known under the trade name of wood gum, also insoluble gum arabic. Large quantities of these gums are used in various manufacturing processes, such as calico printing and dyeing. It should find a ready sale in quantities in Europe, as it is of very good quality.

FRUIT BOXES.—The Secretary of the Department of Agriculture has received a letter from the British Columbia Manufacturing Company, enclosing price list of their spruce fruit and berry boxes, and asking to be put into communication with some firms who would be prepared to do business. These boxes are largely used in other parts of the world, and are a cheap and clean way of packing fruit for the market; adding much to the appearance and value. The Secretary has replied asking them to send out sample cases in shoos, which on arrival will be placed on view in the Museum of the Department of Agriculture. A small sample of the wood has been sent out and can be seen by anyone interested. The following is the price list submitted per hundred:—Egg cases, 15 dol.; apple boxes, 7½ dol.; pear boxes, 7 dol.; 4 inch plum boxes, 4 dol.; 20 lb. plum boxes, 4 dol.; 5 in. tomato or peach boxes, 4½ dol.; 5 lb. cherry boxes, 4½ dol.; 5 lb. wood top, grape or plum, 7 dol. per thousand, and crates for same, 4 dol. per hundred; 5 lb. tin top, grape or plum, 9 dol. per thousand, and crates for same, 4 dol. per hundred.

REGULATIONS REGARDING VEGETABLE DISEASES, ETC.—Mr. A. Despeissis, viticultural and horticultural expert to the Department of Agriculture, writes as follows:—The Tasmanian proclamations and regulations relating to vegetable diseases and nursery stock now in operation in that colony, are much more drastic and sweeping in their scope than those of West Australia, which were the first proclaimed in Australia, in order to guard against the introduction of noxious pests. South Australia and Victoria have for some time adopted our policy. Tasmania, where fruit-growing is one of the leading industries, now absolutely

prohibits the introduction of any fruit trees, cuttings, scions, buds, and grafts of fruit trees. The only exception made, is in favour of citrus trees, cone bearing trees, ferns, cacti, geraniums, and bulbs, which, however, have to be unpacked and examined by an inspector at the port of entry, fumigated with hydrocyanic acid gas, and the packing has to be destroyed. If any such plants are found to contain any pest, the same shall be destroyed forthwith. (Regulations under the Vegetation Diseases Act, 1898, 62 Vic., No. 21, Hobart, June 22, 1900.)

BEE CONFERENCE.—Mr. W. S. Pender, editor of the *Bee Bulletin*, writes to the Hon. Minister for Crown Lands as follows:—“I read with interest the report of the Beekeepers' Conference in the *West Australian*, and must congratulate you on the broad lines you have attempted to help the industry. I think you have gone the right way to work to place the industry on a firm footing, but I regret to see the short-sighted selfishness of the beekeepers who attended the conference. It is the same everywhere, jealousy gets rife among beekeepers, and no rapid progress can be made. The industry has been greatly helped by our Education Department sending a lecturer round the country pointing out the profits in honey production, and giving good practical information. If, when I first started beekeeping, I had the help of a lecturer, I would have saved many pounds, but it was all experience, and paid for dearly in many instances. If you got a good practical beekeeper to deliver a few lectures, I think you would do more for the industry than you can do in any other way. In starting an apiary the main thing is a right start, and if you start a number of men on the right track others will follow, and the industry will go ahead in spite of the opposition of existing beekeepers.”

ADULTERATED HONEYS AND JELLIES.—Outrageous violations of the law concerning the sale of honeys and jellies have been discovered by State Chemist Hummel, says the Interstate Grocer, of St. Louis. Samples of “honey” just analysed, although harmless, are no more like honey than Mr. Hummel is like Hercules. Jars of stuff, labelled as the finest California honey, contained nothing but glucose, without even a drop of the bee product. In some cases the remnant of a honey-comb was inserted, giving the glucose a flavor of the “real thing.” About one-third of the samples of alleged honey contained either none or only a little material beyond glucose and cane sugar. The violations of the law are exceptionally flagrant. Similar adulterations have been discovered in jellies. These are made of glucose, starch, flour, gelatine, and artificial coloring. The latter in some cases was found to be injurious. Of the samples examined only 25 per cent. were found to be pure jelly. The State chemist called attention to a deceptive label on jars now being sold in this city. On the label the name “raspberry jelly” is printed in large letters, and over it “best flavored” with a postscript in very small letters to the effect that the “raspberry” flavor comes from apples.

PLANTAINS AND BANANAS.

By PERCY G. WICKEN.

Inquiries having been made as to the method of cultivation, and the best varieties to grow in West Australia, the following notes may prove of interest to intending growers:—

The plantain usually attains a height of about 8 ft., and in favorable positions often reaching 12 to 15 ft., and the stalks a foot in diameter, it is one of the most striking instances of tropical fertility, growing in a few months to a size that takes other plants in cooler districts several years to attain. The plantain is to many thousands of people in the tropical islands, what rice is to the Hindoos, rye flour to the Russian, and wheaten bread to the Englishman, it is their staff of life. It is claimed as a native both in the old and new world, and has been cultivated for ages in both hemispheres.

The banana is similar to the plantain, but the fruit is smaller. There are several varieties to be obtained in Western Australia, viz., the sugar banana, apple banana, pear banana, Cavendish or Fiji, and the Chinese banana; this latter variety is the one most likely to prove successful in the stretch of country between Perth and Geraldton. It is a comparatively dwarf species, the stem attaining a height of only 5 or 6 ft. Its robust and dwarf habit render it particularly fit for exposed localities, and this is one of the reasons why it is so extensively cultivated in the South Sea Islands. It is early maturing, is not so exhaustive on the land as the taller growing variety, and is very prolific.

This variety, as well as the plantain, should grow very well as far south as the Swan river, but it is not likely to give good results further south. There should be a good opening for several large plantations along the banks of the Swan river or the adjacent country, and having a market close at hand, the cultivation of this crop should prove a profitable undertaking. Between the Swan river district and the Northern districts of the colony there should be plenty of spots where the cultivation of the banana might be undertaken on a large scale.

It has been found by experiment that the banana will live, if in a proper soil, without injury to the roots, at a temperature as low as sixteen degrees Fahr., the stalk will stand a temperature of twenty-five degrees without injury, and the leaves are not wilted until the air is chilled to thirty degrees. Although the banana is stated to live at this temperature, it would not be advisable to plant out on a large scale unless the temperature is considerably warmer than that stated. The site for a plantation should be in a sheltered position, and as near as possible to a railway line or convenient water carriage so that the fruit can be carted cheaply to market, with as little handling as possible. When the site is decided upon the land must be cleared and should then be broken up and subsoiled as deep as it is possible to do it. Strong teams of bullocks are best to use for this

purpose, one plough following the other and breaking up the soil in the same furrow without bringing it to the surface. The land then requires harrowing and rolling until in good order. If the land is low, and likely to be covered with water during the rainy season, it will require draining, and if too low for underground draining, open drains should be cut out with the plough at a distance of about one chain apart; the banana likes a rich, moist soil, but will not stand stagnant water.

The land should now be marked out into drills 15 ft. apart each way, and the young plants put in at each intersection of the drills, this will take 193 plants per acre. By planting on the square system we are able to keep the cultivation going between the rows until the plants are fully grown. The banana is propagated by suckers taken from the old plants that have fruited. Holes should be made in the ground deep enough to allow the roots to be placed in as deep as they were when taken from the parent plant. The suckers should not be removed from the parent plant until everything is ready for planting them out in their new home. The roots require planting as carefully, and in the same manner, as you would plant out a fruit tree, and the soil should be well packed round the roots. If the land between the rows is kept free from weeds, the plants will require no further attention, except to replace any that may not have taken root. The shoots or suckers should be taken from the parent stem when from 2 to 3 feet high, their bulbs being divided from the principal bulb by means of a mattock. These slips are cut about 8 inches above the next, and placed in a slanting direction in the prepared holes, and covered with earth leaving in sight only about two inches.

The length of time which elapses between the planting of the slips and their fruiting depends on climate, situation, and variety of species.

During the first year a crop of maize, sorghum, or other desirable crop may be grown between the rows, and will help to pay the expenses of keeping the land free from weeds; after the first year when the bananas begin to bear fruit, they will require the entire use of the land. The suckers will bear fruit from twelve to eighteen months from time of planting out.

After the bunches of fruit have been harvested, the stems should be cut down to the ground, and two or three of the strongest suckers left for successive cropping, all the weaker ones should be cut out or carefully taken up if wanted for new plantations. If properly cultivated and looked after a plantation will keep in good bearing for about seven years, but after that the yield is not satisfactory, and it is better to put the land under another crop. It is not advisable to plant bananas on the same land for some time to come, as it is likely to encourage disease, but a system of rotation of crops is always desirable.

The banana being a quick, rank growing plant, is naturally a gross feeder, and requires to be well supplied with manure, it requires principally, nitrogen and potash. The best manure to use is well

rotted stable manure, dead leaves, etc., that will supply plenty of humus to the soil, it should be applied as a mulch during the summer months to keep the soil moist, and then worked well into the ground with a hoe during the autumn. If artificial manure has to be used a mixture of bonedust, kainait and sulphate of ammonia would give the best results, it should be mixed in the proportion of 200 lb. bonedust, 200 lb. kainait, and 100 sulphate of ammonia, and spread round the roots at the rate of about 3 lb. per plant; this would take about 5 cwt. per acre. It should be applied early in the spring.

The amount of fruit obtained from a plantation of bananas is enormous, 70 lb. of fruit often being obtained from a single plant twelve months after planting. A statement made by Humboldt, once thought exaggerated, that an acre of good land in the tropics covered with plantain would yield as much nutritious food as 144 acres of wheat, is now no longer denied or doubted.

A Sacramento grower, in recording his experiences as to how to grow bananas in the garden, says:—"My method has been to supply the richest food for this gigantic plant, and force it to its extreme growth. Everyone has old chip dirt, ashes, boots, shoes, clothes and manure which are often a nuisance. Dig a big hole, bury this up, in the centre of the mass place a pailful of sand and plant the fresh bulb. This is to preserve the dormant plant from the wire-worms and insects which will not attack the growing plant. As the plant grows, give it an abundance of water, and all the slops of the house. Any kind of manure, fresh or old, ashes, leaves and vegetables will soon disappear, and be absorbed by this gigantic king of plants. As the rainy season approaches, pile all the leaves and twigs of trees around the plants. It protects the bulbs and makes the soil rich for next season."

In addition to its use as a fresh fruit, the banana is of considerable value as an article of food when dried. In a dry climate, where there is plenty of sun, the fruits may be dried in the following manner:—They are exposed to the sun in bundles, and when they begin to wrinkle they are peeled, for the skin, if left on, causes a disagreeable flavor. They are kept for some time until an efflorescence of sugar appears on their surface, as on dried figs and prunes. They are then pressed in masses of about 25 lb. each and wrapped in leaves or else packed in boxes. These methods can only be adopted in countries where the climate is very dry. In others, recourse must be had to artificial means which are, unfortunately, more costly. There are three distinct ways in which the ripe banana may be dried—1st, exposing the fruit to an atmosphere of sulphuric acid gas before the desiccation is begun; 2nd, boiling rapidly very ripe fruit in water which contains sulphate of lime; 3rd, by boiling it in syrup. By either of these, the albumen and caseine of the fruit coagulates, and the tendency of the banana to decay and ferment is stopped at a period favorable for desiccation. Experience shows that the second method is the best to employ, in moist climates, without this precaution the fruit instead of drying becomes damp. To expose the fruit to the sun's rays after boiling, trays of bamboo or of any material which

permits the free action of the air and light may be used. If rain falls they are dried in a furnace or an evaporator. The bananas when dry are pressed, and packed in boxes. Banana drying has been successfully carried out in Queensland. A meal is also made by slicing the banana, drying in the sun, and then grinding into flour, it is very palatable, easy of digestion, and suitable food for invalids and children.

Vinegar may also be made from the banana, when a glut occurs in the market.

The stem of the banana may be used in many ways, cattle and pigs both eat it with a relish, a starch is made from it, but the main use is for making fibre, and this is extensively carried out in Jamaica and other countries, Manila hemp and cordage are made from a species of banana, and over £1,500,000 worth are imported into the United Kingdom annually from the Phillipine Islands.

ITALIAN v. BLACK OR COMMON BEES.

By J. SUTTON, DRAKESBROOK.

Respecting the question of bees, there is no doubt that between the Italian and the ordinary bush bee, there is just as much difference as is found between the well-bred hack and the brumby, and to give my experience after some years close study may be of some service to those who have only a few swarms or those who contemplate increasing their stocks.

I have found amongst bees just as much difference as may be found in other species—good and bad. When Italianising my own apiary, I had one black swarm that was always far ahead of any of its neighbours, and finding that the queen in this particular hive was so large and prolific, I was loath to destroy her, preferring rather to experiment, and found in an ordinary season this hive could hold its own with some of the Italians, both in honey storing, in brood and in bees, but when the honey flow began to wane my favourite was found wanting, as the Italians then went ahead by leaps and bounds, and since which time I have endeavoured to keep clear of too much black strain, as other things being equal, the purer the strain of Italian the better. In a very poor season the Italian bee will gather stores and give a surplus, while the common bee will merely exist and become a prey to the moth or other pest; further, with a small swarm of Italians they will carefully exclude the bee or wax moth.

One thing is of vital importance, without which the apiarist is bound to have trouble, viz., good hives or boxes. I do not think it matters so much as to what size or shape, only experience and the locality can help to a decision respecting this particular, but whatever size or shape may be decided upon, it will be found of paramount advantage to see that in every case each hive is true to

size, and each hive in the apiary an exact duplicate of the others, so that one size of frame can be removed, at any time, to any one hive. No doubt bees can be kept and honey gathered with all sorts and sizes of boxes, but if such be the case, during the swarming season the advantage will be at once so apparent that the apiarist will have less trouble and can easier manage, even the few hives with both pleasure and profit if fitted with frames.

As the honey season approaches, it will be well that the colonies are examined, some fine bright day, to see that they have plenty of stores, and if short, to feed them, as it is absolutely necessary that they should have no lack of food during this time, otherwise the queen will cease to lay, or perhaps she will take advantage of so many empty cells to lay all the more, and owing to the constant drain on the shortage of food to feed the young larva, they will begin to starve, and some cold morning the front of the hive will be found covered with dead bees removed from the hive. Care will then be needed to save those that are left, for once this sets in, without the apiarist has the time to attend to them, the whole of the swarm will gradually die. What may be best to do in a case of this kind I will give in a future paper on spring dwindling. But let me again urge the necessity of seeing that colonies are strong and plenty of young bees as it draws near to swarming time, otherwise when they should be storing they will only commence to breed and fill the hives with eggs and brood.

So soon as swarming commences care should be exercised, and steps at once taken to ascertain, if possible, those which are likely to do so, and if the queen is a good one, never mind so much about her colour. If she has a good strong colony of bees, then examine the frames and remove all the queen cells except the largest and best shaped cells you can see. If good large healthy cells are found on more than one frame, and the queen is one giving good results, then perhaps this will be a good time to remove one of the frames with queen cell attached, together with all the bees adhering to it—be careful you do not take the queen—place this frame into a new hive then bring another frame (this preferred if the young bees are just hatching out) and place this alongside of the former. On either side of these frames place one having some unsealed honey, then place a follower, cover up, and secure the entrance of this new small swarm by stuffing the front with grass, then they will in a day or two remove so much as will allow them exit, or perhaps you may place a piece of perforated zinc on the entrance, the only objection to the latter is that it may be forgotten, and the bees kept in confinement too long. Return to the hive you have removed these frames and bees from, replace the frames with others, either full combs of foundation or extracted frames, cover up, take a note of what you have done, watch for the swarm issuing which may at any bright moment take place.

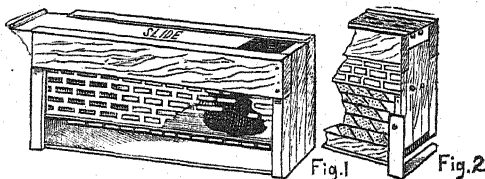
NOTE.—Perhaps it may be well to add, right here, that the apiarist may tell almost to a day when this hive may cast a swarm. If the queen is old and the bees are preparing to supersede her, they may not swarm even then, but usually when preparing to swarm, if

the weather be favourable, this may take place when the first cell is capped over, when the old bees take the opportunity of removing to pastures new, but if the apiarist is handy he may secure them, as they will not fly far before settling and clustering when they can be hived and removed were required, leaving those left to carry on the old swarm as before, only care must be exercised to remove all queen cells except one, otherwise if more are left they may gradually leave in very small swarms, until the original is too small to be of any service. Should the apiarist desire to move this colony, now is his opportunity, as he may move either the new or remaining swarm to any location, and they will go to work contented and happy, the only thing that is needed is to see every frame is closed up, and not any more left with either swarm than there is bees to cover, better have bees a little crowded, adding a frame now and again as they require, than give at any time too many.

ALMOST A SELF-HIVER.

F. G. HERMAN.

There has been a great deal said and written on the subject of self-hivers, and a great deal of experimenting, too, but so far we have not reached any degree of perfection. In an apiary of 60 colonies or



A QUEEN TRAP.

more it frequently happens that several swarms issue simultaneously, and, of course, always cluster together in one huge mass. If the queens are at large with the bees, the cluster will necessarily be hived as one swarm, and the queens will kill each other until only one survives. To prevent this loss, I practice in my home apiary a method with perfect success, which, while it is not exactly a self-hiver, still comes very near to it. A week or so before swarming time, I slip a queen trap on the hive entrance of each populous colony.

Just a word about attaching the queen trap, fig. 1. The directions which accompany the trap are to fasten it to the hive with two nails. It is not the best thing for a beekeeper to hammer on a beehive that is boiling over with bees, so I invented the contrivance herewith shown, which consists of two small pieces of flat iron bent at right angles and fastened to the trap with a screw, fig. 2. To affix the trap to the hive, slip the fastener under the lighting board. No matter

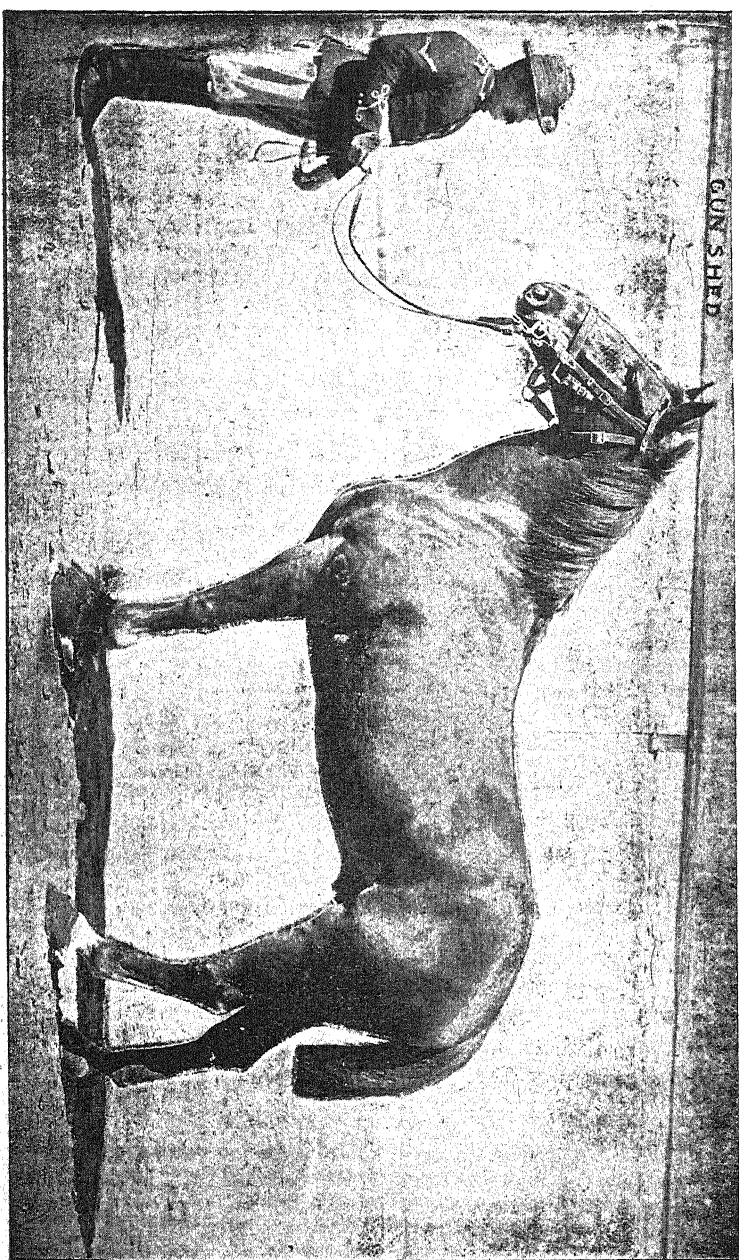


FIG. 7—ARTILLERY HORSE.

how many bees are clustered all over the trap, it can be removed in an instant without even a jar. When a swarm issues, the queen remains in the trap confined in an apartment by herself. I then remove the old hive and place an empty one in its place, also removing the queen trap with the queen, and then sit in the shade and watch results.

The swarm will invariably return in from 10 to 20 minutes and enter the empty hive, for the bees mark the location and come back to their old stand after they have missed their queen. I then release the queen and let her run in with the swarm. I have had three queenless swarms hanging in one cluster, but they returned to their respective hives. I have also had them return and cluster all on one hive. Such a mass of bees could not all enter, so I take the dustpan and brush and divide them. I could not always get the right bees and queens together, but that seemed to make little difference at swarming time, when such intense excitement prevails among the bees.—*American Agriculturist*.

WEST AUSTRALIAN FRUIT IN ENGLAND.

Further reports regarding the condition in which the trial consignments of fruit sent last autumn by the Department of Agriculture to the Agent-General in London, are now to hand. The consignments which were shipped by the Ormuz on April 8, and the Omrah on April 21 last, were reported upon by direction of Sir E. H. Wittenoom, on May 16 and May 29, by Messrs. Keeling and Hunt, fruit brokers, London. That report was reproduced in our July issue, page 28.

With regard to the consignment by Ormuz, the brokers report:—“Case No. 1, Rome Beauty, H. Doust, Bridgetown; case No. 2, Jonathan, H. Doust, Bridgetown; case No. 3, Cleopatra, H. Doust, Bridgetown; case No. 7, Shockley, Mundaring Vineyard Co.; case No. 8, Stone Pippin, Mundaring Vineyard Co.; case No. 9, Kentucky Red Streak, Mundaring Vineyard Co.; case No. 10, Dunn’s Seedling, J. Weidenbach, Cannington; cases Nos. 11 and 12, Jonathan, C. Harper, Woodbridge, Swan. All the above are excellent, and to report on each separately would be superfluous. There was a sample of Dunn’s Seedling in the Ophir parcel (Illawarra Orchard Co.), but the case we examined to-day was packed with much better fruit—evidently not so ripe at time of shipment, and not such large apples. With regard to the Jonathans, one sample (Woodbridge) was not quite so coloured as the other, but as this remark does not apply to every apple in the case, we think it was merely a chance. Cases Nos. 4, 5 and 6, Five Crown Pippins (Illawarra Orchard Co.) very fair quality, sizes too mixed. One case in rather poor condition, but this apple is quite suitable for shipment. With regard to the packing, some of the cases are done very well, but generally speaking, too

much paper is used, and more apples ought to be put into the case. An apple should be wrapped in white tissue paper, and only just sufficient paper should be used as will cover the fruit."

Of the fruit *ex Omrah*, Messrs. Keeling and Hunt report to the Agent-General:—"In accordance with your request, we have examined the above, and we now beg to report in detail. Case No. 1, Dunn's Seedling, J. Weidenbach, Cannington. An excellent sample, fruit of good appearance, and medium size. Case No. 2, Rome Beauty, Hy. Doust, Blackwood: An apple of good appearance and good quality, but too large for shipment to London. A medium-sized apple is much better. Case No. 3, Stone Pippin, Hy. Doust, Blackwood: A good, hard sample, in every way suitable for shipment. Case No. 4, Dunn's Seedling, Hy. Doust, Blackwood: A handsome, bold apple, but too large and too soft for shipment. In this case there was a lot of wasty fruit. Cases Nos. 5 and 6, Strawberry Pippins (or Robinson's Favorite): Very fair quality, sizes a little mixed, but quite suitable for shipment. Case No. 7, Dunn's Seedling, Illawarra Orchard Co.: Very good quality, very much like No. 1. Case No. 8, Stone Pippin, Illawarra Orchard Co.: Very fair quality, mixed sizes, quite good for shipment. Cases Nos. 9 and 10, Kentucky Red Streak, Mundaring Vineyard Co.: A good apple, little dull, but quite suitable in every way for shipment. Cases Nos. 11 and 12, Shockley, Mundaring Vineyard Co.: An excellent apple, of good appearance, quite good in every way for shipment."

Sir E. H. Wittenoom, writing to the Colonial Treasurer, adds: "From this you will gather that the majority of the varieties forwarded are suitable for shipment to London. I am informed the following in addition—the fruit should be packed with less paper, and more apples placed in each case, which, with advantage, might be a little larger. In three of the boxes there were a large number damaged. It is also advised that the fruit be picked in a less ripe condition, which would enable it to be conveyed without sustaining damage. I have distributed this consignment amongst the agricultural press, Sir Gerard Smith, Lady Robinson, Lady Broome, and others."

POULTRY RAISING.

GRIT AS AN ELEMENT OF SUCCESS.

Mr William Cook, a famous English poultry breeder from Orpington House, St. Mary's Cray, Kent, England, has been paying a visit to the Eastern colonies, and whilst in Sydney, he delivered a lecture in the Town Hall under the auspices of the Agricultural Department of New South Wales, which was presided over by the Hon. Minister of Agriculture.

One of the great secrets of success in poultry management lies in keeping the birds properly supplied with suitable grit. To birds in confinement, it is indispensable. To them it is what teeth are to animals. This is pretty generally recognised among poultry-keepers, though few, it is feared, act up to the light that is in them. The value of grit was one of the points which Mr. W. Cook brought out strongly in his lecture on "How to make Poultry Pay." Mr. Cook was not only one of the earliest, but has always been one of the most persistent, advocates of the use of sharp grit in England. And results have amply justified his advocacy.

"I have often been asked in the old country," he says, "the cause of my success with poultry, particularly in the early days, when I made poultry pay and others could not. I have been asked similar questions in the colonies. My answer has been that I have succeeded by studying every requirement of the feathered tribe—studying nature and trying to assist it. I have found that the greatest secret of making poultry pay in confined runs, not only on a small, but also on a large scale, is by giving the birds sharp grit. I'll explain this. Animals, when they take their food, masticate it, swallow it, and it is digested. Not so with poultry. Birds swallow their food, and the crop is the receiver. Then it passes into the gizzard, to be masticated or ground. No later than 19 years ago, people in England could not keep fowls healthy, even on a farm where they ran them thick. The chickens died off, and the old hens had liver disease and tuberculosis, as where there are a number of fowls they clear the whole of the ground of all kinds of rough material, such as shells, little pieces of broken stones, glass, cinders, and the like. Wherever there is a loamy soil there is usually a quantity of earth-worms. The more worms the better, for they are invaluable for fowls. Like fowls, worms swallow grit, and they go down into the ground from 3 ft. to 7 ft. sometimes to obtain it. When fowls swallow worms they get nutriment, but that is not all. It is the grit that is inside the worm that does the fowls more good than the meat. Where this is not the case, and the same thing applies to Australia, people in England would not be able to keep anything like the number of fowls on the same piece of land as they do. Of course, in England we get very few worms from the end of May until September. In Australia I understand worms are scarcer, as of course they cannot exist without moisture. If any of your readers dissected a large worm and washed the contents carefully, they would find that it had both a crop and a gizzard, or, as some naturalists call it, two stomachs, and they would often find grit in the worm more than $\frac{1}{2}$ in. across. Thus, if the fowls are fortunate enough to get hold of worms they get necessary grit. This practically has been the salvation of young chickens in many parts of the world.

"It is said that I was the first man in England to notice the importance of the grit question to the feathered tribe. Many of the old school said it was unnecessary. Now, white glass, old china and

crockery should always be broken up for the fowls where people cannot get anything better. Such materials should be reduced to pieces half the size of a threepenny piece, and portions of it finer. To see how the fowls relish it, you have only got to start breaking it up in the run, and if the operator is not careful the fowls will get their heads under the hammer in their eagerness to get the pieces. I have always found flint grit the best. It lasts longer in the gizzard than anything else. Glass ranks next, and china may be given third place, and crockery fourth. I wish it to be understood that poultry require shell grit at the same time. A certain amount of the shell helps to do the work of grinding in the gizzard. It will always be found that where there is a deal of sand or cinder ashes the fowls can do with less grit, as it helps to hold the other material in the gizzard to do the work of grinding. I also wish to make it plain that if fowls have all glass or flint knocked up fairly large, and no fine stuff, like the dust or sand, it does not do its work properly, and the fowls get diarrhoea. It is always necessary for the birds to have cinder ashes, sand, or, some fine rough material. On our large poultry farm in England we always use flint dust, as that is not only rough, but sharp. I always recommend people who have birds to throw their ashes down to them. They swallow a good deal of it, and it helps to make egg shells. Oyster shell, with the gastric juice in the gizzard, becomes a pulp almost at once, and passes into the oviduct, where the egg becomes shelled.

"It is necessary for chickens to have sharp grit directly they are hatched. Whatever grit is used, the fowls should always have shell grit as a form of lime. Some people put a heap of lime down in their runs and let the fowls go and help themselves. That is altogether wrong, because the consequence is that the fowls will often swallow pieces of unslaked lime, and this burns and causes inflammation of the crop. Then, again, lime is smooth in the raw state, and it is of very little good. Clinkers, or hard calcined cinders from engine fires, are very much better than even granite, as the edge of the granite seems to wear off directly. I have opened birds since I have been in the colonies, and have not found a particle of sharp grit in the gizzards of any one of them. These were birds that had gone wrong, and the reason was not far to seek.

"People have different ways of giving grit, and the question is often asked, 'Do you throw it on the ground?' Certainly not, if it is purchased grit, as it is too valuable. If one breaks their own, it can always be put in the one spot, where the fowls can help themselves. But purchased grit ought always to be put in a trough for the birds. It is not a bad plan to mix a little in the soft food, say twice a month, in case some of the birds are a little droopy and have not the energy to pick it up. It is wonderful how droopy birds improve after they have been given grit. Very often in a fortnight or three weeks they do not look like the same birds."

REMOUNTS FOR ARMY PURPOSES.

BY PERCY G. WICKEN.

Continued from Page 21.

The artillery horse, figs. 6 and 7, show the type of horse required for artillery purposes, they require to be strong and active, capable of carrying a good weight, and with a fair amount of speed. The most suitable class of horse for this purpose should be obtained by the use of a Cleveland Bay sire. The Cleveland of to-day, figs. 10 and 11, is essentially a clean legged coach horse, with blood-like head, full, well-arched neck, sloping, through thick shoulders, and well set-on tail. The Yorkshire horse is a somewhat similar type with rather more speed than the Cleveland, and especially noted for his powers of endurance, and would, no doubt, be a useful sire for breeding the class of horse required.

Artillery horses are divided into those for horse artillery and those for field batteries. As the teams of the former have to manœuvre with cavalry, and also drag their guns, they require to be exceptionally strong, smart horses. The latter, as they are supposed not to go faster than a trot, are stronger and slower horses than those of the light cavalry. The wheelers are active, light built, cart horses. For their work they need to be somewhat thick in the shoulders, short in the leg, and of considerable weight, to stop the gun when the order to halt is given. Their hind quarters, loins, and hocks should, therefore, be particularly strong.

The transport horse. Figs. 8 and 9, show the type of horse required for transport purposes. The Suffolk Punch horse, figs. 12 and 13, should be most suitable for this purpose, he is staunch, strong, and possesses great powers of endurance, and keeps his condition on a small quantity of food, he is a fast walker and a light, easy trotter, in height he ranges from 15.2 to 16.2 hands, he is remarkably compact, shows great bone and stands on short legs, which are clean and almost free from hair. Their color is always chestnut, they are very plucky, and will pull, or carry great weights, and can perform long journeys without becoming exhausted.

In order that a man may successfully and profitably breed horses, a few things are essential. In the first place he must be a fair judge of a horse, he must understand the desirable conformation, action and characteristics of the horse he is trying to produce, and the greater his knowledge the better. He must, provided he intends breeding for the market, carefully study that market, and ascertain which class of horses are in demand at fair prices. Then he must decide which of those classes his particular tastes or fancies, and conditions warrant him in endeavoring to produce. He must fix in his mind a definite standard, and work up to that standard. He must not expect to reach his ideal all at once, he must have patience and per-

severance, and must not become discouraged if he fails in his first attempt. Success in breeding horses, as in all other departments of farm management, must be measured by the actual value of the products, and the profits derived from them. The relative value of animals depends upon their adaption to a particular purpose, and the returns they make for expense incurred and the food consumed. The importance of securing males of the best quality—males that from their superior breeding will be likely to be prepotent—to mate with the mares at our disposal, cannot be too strongly urged as one of the readiest means of improvement. It is generally admitted that the more pure or less mixed the breed is, the greater the probability of its transmitting to the offspring the qualities it possesses whether these be good or bad. Economy has made the male in general most important, simply because he sires a great many foals, while the mare produces but one each year.

Whilst care is needed in the selection of a stallion, it is too frequently the case that the best mare on the farm is kept in harness until sold, and the unsaleable is kept for breeding purposes, thereby reproducing her weakness and defects, a system that can be well compared to that of selling every available product off the farm and retaining nothing to keep up its fertility. A man's success in breeding is estimated by his judgment in mating, followed by his skill in feeding and developing. A source of serious loss to many breeders is through starving the colt when young. To produce a good horse, the colt must be taken in hand from birth, and well fed and looked after. If the colt is starved the horse will be stunted. The general practice of turning the colt out in a poor paddock to take his chance until four or five years old is not the way to produce a good animal.

In the *Australian Pastoralists' Review* for June, Mr. W. E. Abbott, of Wingen, N.S.W., has been giving his local experiences and opinions on the breeding of horses suitable for military purposes. Out of about a million horses in Australia, he points out, it has only been possible to get 5,000 or 6,000 of all sorts by the British officers, and those obtained have cost three or four times as much as they ought to have cost. Of those procured, the great majority, he declares, were mongrels. He claims that horses should be bred as cheaply as bullocks. The great obstacle in the path is that we have no breed of horses of the kind required kept pure long enough to establish a type. Our saddle horses, he points out, are crossbred, with a very considerable strain of the racing thoroughbred, and are really mongrels of the very worse kind. Excepting for racing short distances, the blood horse is useless. To establish a breed of military horses, he argues, it would be necessary to follow the well-known system by which Shorthorn, Hereford, and Devon cattle were established—by selecting from within, carefully avoiding all crosses, and keeping clear of thoroughbreds. One color should be chosen, and this could easily be preserved.

As to what is being done in other parts of the world in the matter of breeding horses for military purposes, the following

extract is taken from the *English Live Stock Journal* :—"It is interesting to note the enormous grants made by foreign Governments to their horse-breeding establishments : France maintains her breeding sheds at an annual cost of about £270,000 ; Austria devotes to the maintenance of her sheds, the purchase of promising young stock and allied expenses, about £140,000 ; the Hungarian Government votes £116,500 a year for horse-breeding, but spends in addition large sums in buying horses ; Germany works on more economical lines, she votes an annual purchase fund of £45,000, and runs her breeding establishments on business lines, whereby they cost her only about £3,400 a year. Yet Austria, Hungary, Germany and France are still able to find better breeding stock in England than they can at home."

In India the Government have given up horse-breeding, but they continue to import stallions whose services it supplies gratis to the best mares of country breeders. About 300 stallions are kept by the Indian Government for this purpose.

The following are a few suggestions as to what might be done to improve the breed of horses for military purpose without incurring too great an expense:—

"To place a tax on stallions, thereby trying to improve the type of horse retained for breeding purposes."

"To pass an act to compel jockey clubs and racing societies to fix their minimum weight at not less than 8st. 7lb., thereby discouraging the breeding of light horses, which can only carry a light weight for a short distance, and are utterly useless for any other purpose."

"To encourage breeders to breed the type of horse required by offering substantial prizes for this class, through the medium of the country agricultural shows."

"For the Government to import some good stallions of the types required, and distribute through the country in the same manner as has been done to improve the breeds of cattle."

"To request the Imperial Government to station an officer in the Australian colonies to make periodical visits for the purpose of purchasing and shipping horses suitable for army purposes."

Since writing the above, the following account of the last shipment of horses has appeared in the daily papers :—A record shipment of horses left Sydney on June 12th for South Africa in the S.S. Ripplingham Grange. The total number shipped in this mammoth craft was 1,085, of which Queensland contributed 495 and New South Wales 590. The nearest approach to this record is a shipment of about 900 horses taken from Argentina. The Ripplingham Grange proceeds direct to Durban for orders, and may be sent to any part of the South African coast at which the Imperial authorities happen at the time to be most in want of horses.

Messrs. Houlder Bros. are the contractors to the Imperial Government for the carriage of horses from Australia, Hungary and South America, and during the Transvaal war have established several records. Altogether Australia has supplied about 10,000 horses (and more are to be sent) and of that number only $1\frac{1}{2}$ per cent. have been lost on the voyage. Colonel Hunt (of the Army Remount Department) and Captain Nuthall (Royal Army Veterinary Corps) who have purchased and shipped the horses, are quite satisfied that their consignment will reach its destination in a satisfactory condition.

This proves that a considerable business is already being done in horses for army purposes, and it is to be hoped that Western Australia will soon be able to figure prominently in the list of exporters.

REPORT ON EXPERIMENTS CARRIED OUT AT THE EXPERIMENTAL PLOTS AT DRAKESBROOK.

By G. BERTHOUD, MANAGER.

SORGHUMS, 1900.

Sorghum, No. 2316 (Colman).

Seed imported from the Department of Agriculture. Washington, U.S.A.

Sown 26th October, thinly in drills 30in. apart.

Manure, bonedust and superphosphate in equal quantities, applied in the drills at rate of 2cwt. per acre.

Young plants up 31st October, germination very good.

Growth even and fine, canes medium size and very sweet; good variety for dairy stock, stands up well. The earliest kind grown here, seed ripe 4th May, heads compact and well filled, seed reddish brown, product of seed rate of 1,560lb. per acre. Mature height 9ft., level and very even.

Weight of stems and seed, rate of 30,680lb. per acre.

Soil new, low and fairly moist, but well drained.

This is a first-class variety.

Sorghum, No. 2331 (Collier).

Seed imported from the Department of Agriculture, Washington, U.S.A.

Sown 27th October, thinly in drills 30in. apart.

Manure, bonedust and superphosphate, equal quantities applied in the drills at rate of 2cwt. per acre.

Young plants up 31st October, germination even and good.

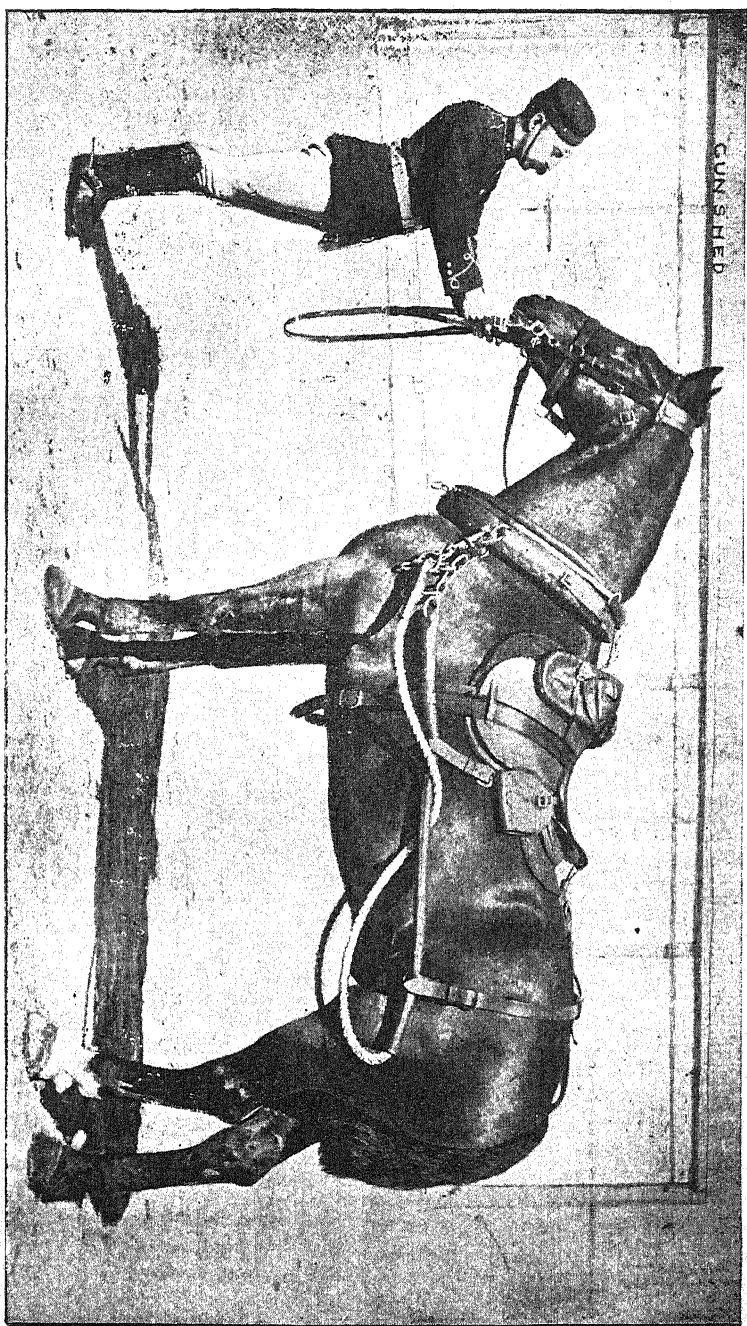


FIG. 8.—TRANSPORT HORSE.

Growth very strong, tall and leafy, leaves wide and long, stems juicy and sweet; stems and foliage still green at end of June, seed barely ripe, stands up very well. Mature height 12ft. Growth very even and level.

Ripe 30th June, heads large, heavy and spreading, seeds light brown

Weight of seed at the rate of 1,800lb. per acre.

Weight of stems and seed at time of cutting, 48,000lb. per acre.

Soil new and moist, well drained.

This is the latest and most productive variety of *Sorghum* tested here.

Sorghum, No. 2341 (*McLean*).

Seed imported from the Department of Agriculture, Washington, U.S.A.

Sown 26th October, thinly in drills 30in. apart.

Manure, bonedust and superphosphate, equal quantities, applied in the drills at rate of 2cwt. per acre.

Young plants up 31st October, germination good.

Growth good and even. Mature height 9ft., stems leafy and fairly sweet, medium size, rather weak, does not stand up well against rough weather.

Ripe 10th May, not very even, heads medium size, compact, well filled, seed light brown, seed produced at rate of 1,560lb. per acre.

Weight of stems and seed at date of cutting, rate of 28,600lb. per acre.

Soil new, low and moist during time of growth.

A fairly good variety.

Sorghum, No. 2363 (*No. 161*).

Seed imported from the Department of Agriculture, Washington, U.S.A.

Seed sown 25th October, 1899, thinly in drills 30in. apart. Manure used, bonedust and superphosphate, equal parts, 2cwt. per acre, applied with the seed in drills.

Young plants up 30th October, germination strong and even.

Growth good. Mature height 8ft. to 9ft., stems large, leafy, tender and juicy, fairly sweet, good sort for green feed, shoots up strongly after cutting better than any of the other kinds tried here. Plants fall about considerably if subjected to high winds.

Seed ripe 18th May, heads large and compact, seed pale brown. Seed produced at the rate of 1,170lb. per acre.

Stems green and sweet when harvested. Weight of stems, including seed, rate of 29,200lb. per acre.

Soil new, low and moist during the summer.

Sorghum, No. 2371 (*Chinese*).

Seed imported from the Department of Agriculture, Washington, U.S.A.

Sown 24th October, thinly in drills 30in. apart. Manure, bonedust and superphosphate, equal quantities, applied in drills at rate of 2cwt. per acre.

Young plants up 31st October, germination very good.

Growth fairly good, stems slim, not very sweet, weak, falls about in rough weather. Mature height 8ft., even and level.

Ripe 8th May, heads open and spreading, seeds black. Seeds produced at the rate of 780lb. per acre.

Weight of stems and seed rate of 23,400lb. per acre.

Soil new, low and moist.

Rather an inferior variety.

Sorghum (Common Black Seeded.)

Seed locally grown.

Sown 20th October, thinly in drills 30in. apart. Manure, bone-dust and superphosphate, equal quantities, at the rate of 2 cwt. per acre.

Young plants up 28th October, germination good and even.

Growth fair, stems slight and weak, falls about considerably. Not very sweet. Mature height, 8ft. to 9ft.

Ripe 9th May, heads spreading and small, seed black. Seed produced at the rate of 520lb. per acre.

Weight of stems and seed, 14,560lb per acre.

Soil new, level, and moist. This plot proved to be somewhat wet and sour, otherwise the yield would have been somewhat better.

Not very productive variety.

Maize (1170).

Seed received from the Department of Agriculture, Washington, U.S.A.

Sown 25th October, drills 36in. apart, and the plants 24in. in the drills.

Young plants up 31st November, few plants only. The seed appeared to be old.

Growth weak and poor, stems slight, falls about badly. Mature height, 7ft. to 8ft.

Some of the plants set several cobs, but none matured seed.

This variety proved a failure for this locality; may be of use under tropical climate.

You will note that the new kinds of *Sorghum* introduced from the United States of America are much superior in productiveness to the older sorts commonly grown here; they also contain more sugar, therefore, better for feeding to dairy stock. The past summer, owing to the late rains, was a very favorable one for the growth of this class of plants. They are worthy of the attention of farmers for autumn feeding, when the natural grasses are bare. The best time to sow is September, October, and November. Seed may then be sown thinly broadcast, say about 20lb. per acre, and harrowed in like wheat. Manure should be applied at the rate of at least 2cwt. per acre—bonedust or superphosphate.

EXPERIMENTAL PLOTS.

During last May the Secretary of the Department of Agriculture instructed Mr. P. Wicken, of the Department, to proceed to Beverley, Katanning, and Northam for the purpose of establishing some experimental plots on land kindly lent for the purpose by Messrs. Lukin, Piesse, and Throssell. A number of wheats and grasses were sown at each place, and reports have just been received as follows:—

Sonora Wheat.—Seed imported from America, growing well at Beverley and Northam, but not so well at Katanning.

Manitoba Wheat.—Seed imported from America, germination fair, growth poor and weak, does not look promising at either place.

Bluestem Wheat.—Seed imported from America, germination fair, growing well at Beverley and Katanning, but not so well at Northam.

Steinwedel X Jubilee Wheat.—Local seed, germination good, growth strong and healthy.

Quartz X Jubilee.—Local seed, germination good, growth strong and healthy.

Early Para Wheat.—Local seed, doing well at Beverley and Katanning, but germination uneven at Northam.

Fillbag Wheat.—Local seed, doing well at Katanning, fair at Northam, and poorly at Beverley.

Hungarian Forage Grass.—Germination good, but plants appear to be affected by frost. Caterpillars are attacking this grass at Northam.

Prairie Grass.—Not showing at any of the places. This seed was imported from England, and must have been old seed.

Tall Meadow Oat Grass.—Germination good, and doing well in all places.

Sheeps Burnett.—Slow in germinating, but looking healthy in all places.

Sanfoin.—Seed germinated well, but making slow growth.

Eleusine Coracana and Mitchell Grass.—Neither of these have come up; they both require warm weather to make them germinate, and will require to be sown again in the spring.

NOTE.—The imported wheats do not compare with our local grown seed in germinating power and early growth, how they do later on will be reported upon on future occasions.

POULTRY KEEPERS' ASSOCIATIONS.

FIRST ANNUAL CONFERENCE.

The first annual conference of delegates from the poultry societies in the colony was held in the Museum of the Department of Agriculture, West Australian Chambers, on Friday, July 6th. Mr. L. Lindley-Cowen, Secretary for Agriculture, occupied the chair, and there were also present: The Hon. the Minister for Lands (Mr. George Throssell, M.L.A.), Messrs. F. Craig, and R. Gell, of the advisory board to the Department of Agriculture.

The chairman briefly expressed his pleasure at the attendance of the delegates, and extended a welcome to them. He then introduced the Minister for Lands.

Mr. Throssell said he had received the request from the Secretary for Agriculture to preside at the opening of the conference of poultry breeders, with very great pleasure. They were living in the days of conventions, and it was only right that such an important industry as poultry raising should be properly recognised. There were four societies represented, according to the business paper, and though this was a small beginning he had reason to believe, from what he had seen during his travels through the country, and from what Mr. Crawford had informed him, that the industry was now coming to the front. When they remembered that they were sending away £1,000 per month for eggs it would be seen that the industry was one that needed improving. During the last five years they had imported eggs to the value of £200,087 from the Eastern colonies, and it was the duty of the Department of Agriculture to give every encouragement to the industry. He supposed he was right in saying that the pursuit was not all beer and skittles. It was not simply an easy vocation with big profits, for there was much care needed to keep away disease. (Hear, hear.) He understood that one of the duties of the conference was to teach people how to detect and guard against the spread of disease in poultry, and to better the industry. One thing, the labour of poultry farming was not arduous and could easily be done by the women and children on a farm. With the prospect of freetrade under Federation in the near future, it was necessary to look to these side issues. Comparing the industry now with the past, in his district poultry had increased in value, but they had to teach the people how to breed for best results. He was glad to see representatives of the Coolgardie Society present. This was the first society established on the fields. Only a few years ago there had been a barren waste, but since then, besides their famous gold returns, they had a flourishing poultry society, which would hold a big exhibition, he understood, on the 13th inst. Before sitting down he wished to mention the name of one who put forward great exertions to further this industry, he referred to the late Mr. W. Hearman. (Hear, hear.) He was an enthusiast, who opened the first show in Northam and spared no expense to make it a success.

Enthusiasts were needed in any industry, and they were wanted in this, and though they might be deemed a nuisance by their neighbours, they should be welcomed as a benefit to the community. If they brought before him practical suggestions as to how he could benefit the industry, and showed that they were in right earnest in the matter, he would give their request his most favorable consideration, and he assured them that the Forrest Government was not backward in supporting any movement for the benefit of the community. He had been twitted with having too many experts in the colony, but though, perhaps, this might be true, he could not see why they should not place the responsibility of educating the people on Mr. Crawford, who had already the dairying and bee industries under his control. Knowing him as he did, he felt that no better choice could be made, and he had no doubt that Mr. Crawford would do all in his power to assist the poultry farmers. There was a resolution on the paper favouring the Government granting ground for show grounds. This was rather a large order, but if they could show him that they meant business, he would do his best for them. He had pleasure in declaring the conference open. (Applause).

Mr. Gell proposed a vote of thanks to the Minister for his presence and address. He admitted having but scant knowledge of poultry raising, but there was no doubt of its importance and the necessity for its encouragement.

Mr. F. Craig seconded the motion, and held that the figures quoted by Mr. Throssell were sufficient argument for promoting the industry.

The Chairman, in putting the motion, said it was the intention of the department to hold conferences of specialists in various lines of agriculture. The producers, bee-keepers, and poultry farmers had now met, and the next conference would be for pig breeders. He had always taken a deep interest in poultry, and he trusted that the convention would show the department how it could help them. (Applause).

Mr. Throssell, in reply, stated that it had just occurred to him that the Royal Agricultural Show committee had lately applied to the Government for a grant of land between Perth and Fremantle, and they would sell the old show grounds at Guildford. The desire for the change was in order to bring the shows nearer the centres of population. The ground asked for is valued at £10,000, and he recommended that the convention should suggest to the Government that, in the event of this site being granted, a condition be inserted to enable other shows than those of the Royal Agricultural Society being held there.

The following return showing the importations of poultry and other birds and eggs was laid on the table:—In 1895, 1,196 crates, of a value of £1,786; in 1896, 2,671 crates, of a value of £3,196; in 1897, 1,706 crates, of a value of £3,218; in 1898, 1,211 crates, of a value of £2,059; in 1899, 837 crates, of a value of £1,610. In 1899,

735 crates poultry, £1,486; other birds, 102, value £124. Eggs.—1895, 359,881 doz., valued £11,920; 1896, 777,651 doz., valued £33,389; 1897, 941,782 doz., valued £51,429; 1898, 1,027,967 doz., valued £52,667; 1899, 1,199,562 doz., valued £50,682.

Mr. H. P. Woodward (Perth) moved the first resolution: "That in the opinion of this conference an expert should be appointed as a poultry inspector; his duties being to deliver lectures on poultry breeding and the diseases to which all classes of poultry are liable, and also to give instructions throughout the colony as to the best breeds, having regard to utility as layers and for table purposes." He pointed out that there had been experts appointed for dairying, viticulture, and other branches of the industry. Poultry keeping was important, and they wanted to encourage the farmers to breed good fowls, and stamp out disease. At the present time fowls were allowed to run wild in the bush, and were then sent to market full of disease. It only needed an expert to teach these people how to eradicate the disease for them to take advantage of their opportunity. If carefully attended to, poultry raising paid well. An expert could tell people what breeds of fowls were best suited for the hot or cool portions of the colony.

Mr. Gervase Clifton (Perth) seconded the motion, and gave many illustrations in support of an expert being appointed. Mr. Robertson supported the motion, and pointed out that the majority of poultry keepers were absolutely ignorant of diseases in fowls, or the means of eradicating them. He produced a specimen of the fowl tick, which, he said, was prevalent at Cue, York, Northam and, in fact, more or less all over the colony.

The Chairman pointed out that, judging by the Minister's opening address, the Government was not disposed to add to the number of experts just at present, and he suggested the appointment of local inspectors in the various districts, whose travelling expenses would be allowed them by the department. It was not possible for one expert to travel all over the colony and be asked for a solution of the difficulty so that he could give effect to their wishes.

Mr. Glenn, in supporting the motion, suggested that Mr. Robertson, who was constantly travelling round the districts, should act as an inspector, and give advice where required.

Mr. Bridges supported the suggested appointment of Mr. Robertson.

At the invitation of the chairman, Mr. Moreton Craig stated that poultry was described under the term of stock in the Stock Act, and all owners had to report any outbreak of disease to the Stock Department. On a complaint being received, an expert was despatched to the place, and applied the needed remedies. Concerning the tick in fowls, it was prevalent from Kimberley to Esperance, and to appoint an expert to visit the places where it existed was impracticable. He advised that an expert be appointed to write articles to the Press on the subject, and contended that this was the best means of educating the people.

The Chairman intimated that if the following motion was approved, a series of articles would be published in the journal on poultry keeping.

The motion was carried unanimously.

Mr. Robertson moved, "That in the opinion of this conference, the Department of Agriculture should cause pamphlets to be printed and circulated throughout the colony, giving information on poultry breeding." He thought the chairman's suggestion with regard to the articles in the journal a good one, and would lead to much good.

Mr. Bridges seconded the motion, which was carried.

Mr. Bridges moved, "That in the opinion of this conference, all duties should be taken off birds imported for stud purposes." He considered it a shame that farmers and fanciers wishing to improve the class of poultry in the colony by importing pure-bred birds should have to pay a high duty, when pure-bred horses and cattle for stud purposes were admitted free.

Mr. R. Thompson (Boulder City), seconded the motion, and in doing so stated that it cost as much to bring in a few pure-bred birds as it did to introduce a hundred mongrels, which might spread disease over the colony. (Applause).

Mr. Robertson moved an amendment that the duties should be taken off all pure-bred poultry imported.

Mr. Woodward seconded the amendment, which was carried unanimously, the original motion having been withdrawn.

Mr. Woodward moved, "That in the opinion of this conference the present freight on poultry should be reduced, and that they should be carried at so much per head, instead of the present system."

Mr. Glenn seconded the motion. The present system of charging freight was so high as to considerably discourage producers from sending their birds to goldfields shows.

Mr. Nathan contended that a good many birds were lost through the present mode of conveyance, and moved as an amendment that the words "and only live fowls delivered should be paid for" be inserted in the proposition.

Mr. Glenn seconded the amendment.

Mr. Curtis, a dealer, urged that this should apply only to birds for show purposes, as he occasionally sent a thousand birds to the fields by the one train, and the counting would hamper things somewhat. He moved accordingly.

Mr. P. Wickham seconded this amendment. After further discussion, Mr. Nathan's amendment was carried.

Mr. Nathan (Coolgardie) moved, "That in the opinion of this conference the present subsidies to first-class shows, such as those held in Perth and on the goldfields, should be largely increased." He suggested that the Government should donate £ for £ for the whole

of the money subscribed to the various societies. The societies were responsible for the conference, and any society working for the furtherance of the colony's interests should be supported.

Mr. Thompson seconded the motion.

Mr. Robertson thought that a minor alteration might be made in making the subsidy apply to all affiliated societies. This would encourage younger and less powerful institutions than those now in existence to make a start.

The Chairman stated that the Producers' Conference had decided to apply for a Government subsidy on a £ for £ basis with the money paid for prizes by the societies at the previous year's show, and this might be the best line to follow.

Mr. Robertson moved in accordance with the chairman's suggestion, and Mr. Bridges seconded the amendment.

Mr. Clifton said the Perth society deserved more subsidy, as they hired the plant out to other societies, and had greater expenses. But something should be done to encourage the small societies.

Mr. Nathan having withdrawn his motion, the amendment was carried unanimously.

Mr. Thompson moved, "That in the opinion of this conference it is desirable that societies should offer special prizes for farmers only, not to be competed for by fanciers or local breeders in towns."

Mr. Glenn seconded the motion.

Mr. Foster proposed that the resolution should be struck out, as it might encourage dishonesty.

Mr. G. Clifton said, as the original proposer of the resolution, but in a slightly different form, he had an idea that the farmers should be encouraged to breed a good bird for table purposes.

Mr. Robertson moved an amendment that the proposition read for local bred birds.

Mr. Curtis seconded the amendment, which was carried.

Mr. Thompson moved, "That in the opinion of this conference the Government be requested to forward coops along the railway lines during show times, at nominal rates."

Mr. Solomon seconded the motion.

Carried.

Mr. Glenn moved, "That in the opinion of this conference the Government be requested to grant, whenever applied for, land for the purpose of show grounds." He referred to the fact that the Perth society had to hold its show in the open, under canvas tents. This would mean possibly a loss to the fanciers, and the possible outbreak of sickness amongst the birds.

Mr. P. Wickham (Kalgoorlie), in seconding the motion, said that as they had no ground on which to hold their show, they had to rent a piece of ground at £10 a week. The tent was being secured

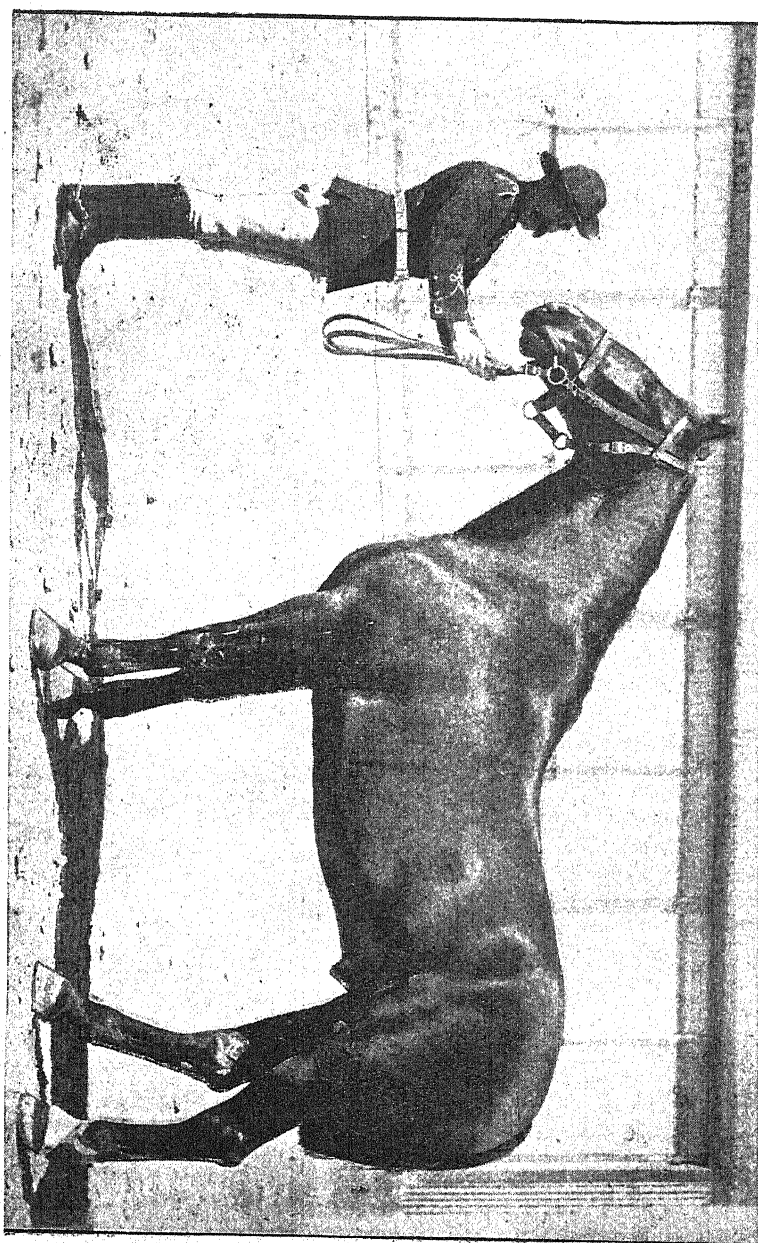


FIG. 9.—TRANSPORT HORSE.

from the Perth society, and with this expense, the freight and other charges, the cost would be about £60, which could be saved if a ground was provided.

* The motion was carried.

The Chairman said that they had not been able to procure any birds for Mr. Nathan's lecture, and invited them to attend in the museum at 11 o'clock in the morning, when Mr. Nathan would give his paper on "Caponising : its utility in regard to economic poultry raising." He thanked them for their attendance, and assured them of his earnest desire to help them as much as possible.

On the motion of Messrs. Woodward and Clifton, a hearty vote of thanks was extended to Messrs. Cowen and Crawford for convening the conference, and for the interest they had manifested in its proceedings. Both mover and seconder felt that the conference would lead to good results.

Mr. Cowen, in reply, stated that he had a most energetic ally in Mr. Crawford. Concerning the appointment of an expert, that must be left to the Government to deal with, but in the meantime they had a man in Mr. Crawford who thoroughly understood his business from end to end, and who would only be too delighted to assist them by every means in his power.

This terminated the business of the conference.

THE WHEAT CROPS.

By R.D., IN *The Australasian*.

Throughout the whole of Victoria, and extending away northward and embracing a considerable portion of Riverina, the cereal crops have made phenomenal progress, and paradoxical as it may seem, their luxuriance is causing a considerable amount of anxiety, not to say disquietude, amongst wheat-growers. Correspondents have written to me from many parts, asking what is best to be done with the wheat crops under the remarkable conditions which prevail. In quite a large number of instances the crops are reported to be three feet in height, and coming out in ear; while in numerous other cases they are so tall that there is a strong probability, in fact almost a certainty, of them becoming laid on a wholesome scale before the ripening period arrives. Growers are puzzled what to do under the circumstances. Under the ordinary conditions of a prolific year the crops would have been eaten off by store stock, and the particular state of things that now prevails would have been prevented; but, most unfortunately, owing to a serious drought which has prevailed over such a wide extent of New South Wales, there is a great scarcity of store stock, not only in that colony, but also in Victoria; in fact, stores are so scarce and dear that they are practically unobtainable at prices that leave any margin of profit for the fattener. Consequently the crops have grown uninterruptedly during a season in which the rainfall has been abundant and the temperature singularly mild.

The question for immediate consideration is: What is to be done? I would suggest cutting the crops and converting the material into ensilage, and several reasons influence me in making this recommendation. In the first place, if the crops now in ear, or approaching that stage, or three feet high, and therefore almost certain to become extensively laid, are allowed to go on without anything being done, the probability is that only a small quantity of grain will be obtained from them, and great trouble will be experienced in harvesting. Where the crops are out in ear, it seems to me that they will be subjected to so much risk before they are fit for reaping that there is a strong probability of no grain at all being obtained. During the next three months we are certain to have frosts of a more or less severe character, and these, acting on the embryo grain in the wheat ears, will, most likely, destroy all vitality, and the heads will contain nothing but chaff. The risk is so great that it is foolish to let the crops remain in their present condition, and, besides, an opportunity of conserving a large amount of fodder is being missed. The services of a mowing machine, or a reaper and binder, preferably the latter if the growth is high enough, should be at once requisitioned, and the crops cut and either stacked or pitted. In weather such as is likely to prevail in midwinter, it is too risky to attempt to make hay, even if the material were suitable; but to make ensilage out of it is a different matter. This can be done without a great deal of labour or expense, a splendid reserve fund of fodder can be collected, and the crops will be brought to such a condition that a good yield of grain may be expected from them later on. It would, I think, be undesirable to cut them lower than about 4in. from the ground; but if that be done they will sprout again, and quickly run up to a good height, while the straw will be strong, and the development of the heads almost, if not quite, as good as if the crops had been eaten off by stock earlier in the season. The root growth is so strong now that the strain on the plant of producing new shoots will scarcely be felt. But it is very important that the cutting should be done at the earliest possible moment. The longer it is now delayed the weaker will be the after-growth, and the lighter the yield.

As there are very few silos in existence, farmers who follow the advice given will direct their attention chiefly to the stack system of conserving the fodder. An ensilage stack should be built on the ground in preference to having a foundation made for it, as in the case of an ordinary hay or grain stack. The surface should be cleaned and made smooth with the spade, and it is some advantage to have a post or upright at each corner to act as a guide in carrying up perpendicularly the sides and ends of the stack, but this is not absolutely necessary. The material should be carted to the stack as soon as it is cut, and 4ft. or 5ft. of the green-stuff should be added every day. In my opinion, the only point to be observed in making ensilage is to control the temperature. This is done by adding weight, so as to exclude the air, and thus prevent the generation of too much heat. Ensilage has been made without pressure, and has occasionally turned out well, but it will be found in practice that on account of

the waste being so great there is no economy in the process. Roughly speaking the best all-round ensilage is made at a temperature of 130deg., the fodder being then neither sweet nor sour, but palatable and nutritious to the animals, and very suitable as a food for milking cows. From 110deg. to 120deg. the ensilage will be considered sour; from 130deg. to 140deg. it will be sweet, and nearly green in colour; from 140deg. to 150deg. it will be brown, while at 160deg. it will be burnt ensilage. To take the temperature while the stack is being built, have a couple of round poles placed vertically in the material, the poles to be manipulated occasionally so that they can be withdrawn when each layer of four or five feet is added to the stack. Down the hole that is thus left a thermometer attached to a string can be lowered, and the aperture closed so as to retain the heat. After a few minutes the thermometer can be drawn out and the record noted. When the proper temperature has been reached another layer of stuff should be added to the stack, the weight of which will check the generation of heat in the material previously built in. For the first two or three layers, even if the intention is to make sweet ensilage, it is hardly advisable to let the temperature rise higher than about 115deg., because it takes time to add another four feet to the height of the stack, and while this is being done the heat in the lower layers will keep on increasing, the ratio being in accordance with the actual weight applied. Of course, if a system of mechanical pressure is employed the temperature can be regulated to a nicety, but these appliances are expensive, and very few farmers have them on hand.

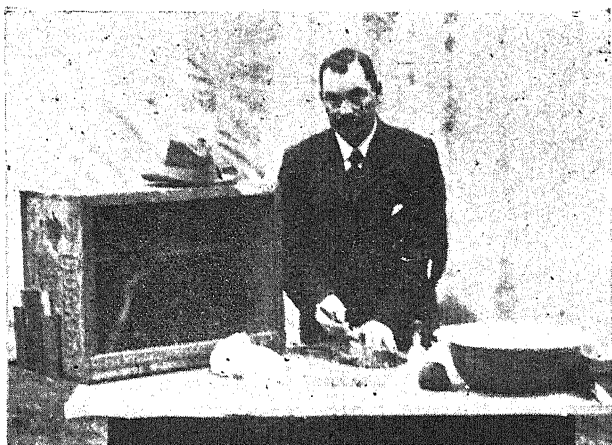
I do not think any farmer need be apprehensive of his ensilage going wrong. It is, as a matter of fact, difficult to make a mistake in conserving fodder in this way, and whether it is sour or sweet the cattle will eat it with relish, and when the grass is dry in summer its succulence will be greatly appreciated, and its effect shown in the increased flow of milk from the cows.

ECONOMIC POULTRY FARMING.

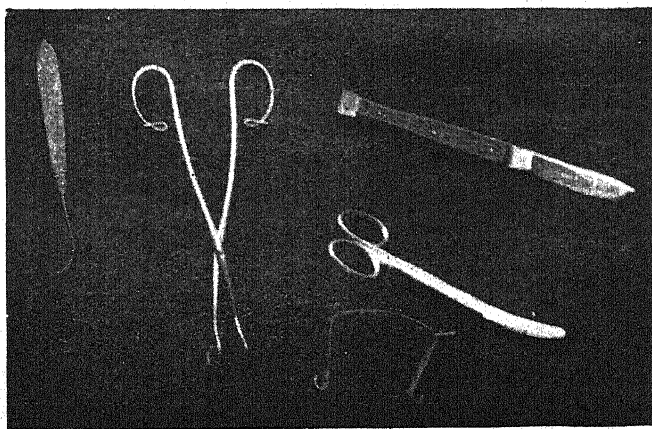
THE ART OF CAPONISING.

On Saturday morning, July 9th, at the Department of Agriculture, Mr. H. Nathan, V.S., inspector of stock, delivered a lecture on the art of caponising, before a large number of poultry-breeders. Mr. Nathan said that it was not generally known that the capon was the greatest adjunct to economic poultry-farming. The art of caponising enabled the poultry-farmer to carry out his operations on the same methodical principles of all other live-stock industries. The capon had a far greater use than other emasculated domestic animals, namely, that of being trained for the purpose of rearing broods of young chickens. The art of caponising was well known and practised by the ancients, the capon being deemed as essential to the patrician table as bullock meat and mutton were to ours of the present day. Mr. Nathan mentioned many ancient writers who referred to capons

having been used for bringing up broods. The methods of caponising adopted by the ancients were explained, and the lecturer proceeded to give his method of training a capon. He said that the bird should have been operated upon at least two months. It should be placed in a box 3ft. deep by 1½ft., which should be fitted with a lid for ventilation, but totally excluding the light. This box should rest perpendicularly on level ground, with the lid uppermost, and a flap-door, constructed near the ground line, large enough to introduce the hand with some food in it. Give no food or water for 24 hours, after which period introduce some wheat in your hand through the flap. If the bird eats, two or three fairly large chicks may be introduced and fed with it; but, if a rebellious spirit is exhibited, immediately withdraw the company and institute further solitary confinement. A rebellious spirit seldom lasts more than 36 hours, as birds usually become docile within that period. This operation must be repeated from time to time, for the bird soon notices its companions, and scratches for them; they are welcomed, and the gregarious instinct is established. It now exhibits all the interest of maternal affection, and will exercise its rasorial art, and, if necessary, will die in mortal combat for its adopted brood. The great advantage with the capon is that it will take different sized chicks in one clutch, will cover 20, will act as a mother even after a spell of six months, and, the instinct once acquired, he is always ready to do duty. At 20 months old, if decently bred, the capon is the very acme of perfection for a table bird. By this means the greatest difficulty attendant upon artificial incubation is overcome, and wherever the system has been tried absolute success in poultry rearing has resulted with a minimum amount of labour. Mr. Nathan then exhibited the instruments which he, as expert for the South Australian Government, at the request of the Minister for Agriculture, Dr. Cockburn, had designed for the operation of caponising, and which he said were not costly. He then gave the following description of the operation:—A board 2 ft. square is required. A tape for securing the wings should be nailed a foot from each end, and 4 in. from one side. At right angles to this, near the top end, nail another for securing the head. Opposite to this, at the other end, a similar piece of tape nailed will secure the legs. Thus your bird is fully extended placed on its left side. The instruments required are a protractor or spring, a blunt hook, and a knife with a broad convex blade, and forceps, specially constructed, with a ring closing on a flat electro-plated disc. Take an aseptic sponge that has been soaked, after having been thoroughly cleansed from dirt, in a solution of corrosive sublimate (1 in 1,000) and thoroughly wash the seat of operation with this dilution. Feel for the last two ribs, and remove any feathers which may be in your way. Divide by one stroke the muscle between these ribs, and place the protractor in the opening. On looking into the wound a blood-clot will generally be seen, on removal of which a shining semi-transparent membrane (the peritoneum) will be exposed to view. Tear this with the blunt hook, and on carefully removing the intestines to one side with the forceps, the glands will be brought into view, situated on either side of the spinal



Mr. H. Nathan Caponising Poultry



Caponising Instruments.

column as glistening white bodies. These should be gently twisted, and removed through the cavity. The protractor should now be removed. All that is necessary after treatment is to keep the bird on soft food for two or three days. Always fast the bird to be operated on for 24 hours previously to operation. Mr. Nathan then operated on two fowls by way of explaining, and those present expressed their thanks for the instruction they had received.

OLIVE CROP IN SOUTHERN EUROPE AND THE FRUIT FLY.

The United States consul at Marseilles, France, writes to the Department of State as follows:—

“The olive crop in Italy, France and Spain is practically a failure. As compared with an average crop it will hardly reach 30 per cent. in the opinion of well informed judges. The Italian olives are the greatest sufferers from the pest to which existing conditions are due, the south of France being also affected, and Spain in some localities. The damage has been wrought by a fly known as the *Mosca olearia*, which deposits its eggs in the green fruit. A grub is hatched, and this grub destroys the olive, or at least so injures it that the oil is very inferior in quality, and is especially bad for table use.

“For some years, edible oils have been declining in price, a fair average for fifty years being 38 cents per kilogram of 2.2 pounds. In 1898 European oils fell to 19 and 23 cents per kilogram and Tunis oils went to even 15 cents. Prices have so far recovered, that good local oil is at 38 cents, and Tunis oil at 28 cents. The effect of the shortage upon prices of olive oils for mechanical purposes is well shown by the contract prices arranged for by the French navy. The oils must be pure and pass severe tests. Last year the contracts ran from 11.96 dol. to 12.54 dol. per 100 kilograms (220 pounds). Contracts for similar oils were let a day or two ago at 19.10 dol. for the same quantity.

“In Europe olive oil is used very generally for the purposes for which lard oil is employed in America. The upward tendency of prices is encouraged by a shortage in the cotton-seed crop in America and a deficient crop of oleaginous grains in Africa and India.

“I understand that virtually no effort is made here to counteract the influence of the olive pest. The operations of the insect are regarded as a dispensation of Providence, to be accepted in meekness of spirit. To the lay mind it would seem that the fly could be successfully fought with American spraying machines, provided an effective chemical combination could be found to put in the water.”

The conditions outlined in the foregoing should lead to a greater eastern market for California pickled olives.

REPORT ON FRUIT SENT TO ENGLAND.

Further reports from the Agent-General regarding the condition of the last trial shipment of West Australian fruit sent to England last autumn have been received by the Department of Agriculture.

Sir E. H. Wittenoom on the 22nd June writes to the Hon. the Colonial Treasurer :—I forward herewith a copy of the report of the brokers on the last shipment of fruit by R.M.S. "Cuzco." The fruit left on 6th May, and was reported on by the fruit brokers on the 19th June.

"In this instance, both apples and pears have arrived in a specially sound condition, and for the first time the latter have reached here in a state which renders them edible. This may be owing to the variety chosen for shipment.

One thing which I think calls for special attention in the event of any further attempts being made in this direction next season is the importance of the packing.

No matter how good the fruit is, it is much lessened in value by bad and unsightly paper covering. While some of the fruit in the present cases is neatly wrapped in tissue paper, other is sent in whitey-brown, and again other in old newspapers. This detracts from the appearance and value of the fruit.

Inquiry has told me that Japanese ricepaper has been found among the most satisfactory covering for fruit from California, and as it is partially waterproof, the sound fruit is thus protected from that damaged or slightly damaged in the same case.

This consignment has not been sold, but distributed among the Press and influential people both in London and the provincial centres. I hope later to give you cuttings making reference to the Agricultural Department in the colony.

Commenting on the Agent-General's references to methods of packing, the Horticultural Expert states that the suggestions regarding packing from the fruit brokers in London, have already borne fruit, and a marked improvement is evident from the manner with which the fruit is packed. The first consignment of fruit was sent to the Agent-General last year. It was found when the fruit reached the Department from the orchards that it would not carry unless it was repacked. Owing in some measure to this, the cases opened in London in splendid order, and the fruit brokers spoke highly of the consignment. Complimentary as was that report, it did not convey to the grower's mind the fact that their fruit was saved owing to its having been rehandled, culled and properly repacked. It is not until the growers themselves do actually try their hands at packing that they will realise where they failed, and will remedy their defective methods. In order to better educate those anxious to test the quality of their fruit on the export market, a different practice was adopted this year, and general directions were issued as to picking the fruit, grading it and packing. As they reached the Department, the cases were simply branded, and not opened before being despatched.

The results of the experiments have been satisfactory. Except in an individual instance or two the packing is reported as having been carefully done, and in some cases it is spoken of very creditably."

With the concurrence of the Minister, I propose, says Mr. Despeissis, to test next season the carrying capabilities of some of the best keeping apples when shipped, not in cool chambers at a cost of over 3s. a bushel case, but as ordinary cargo at one-third of that price. I believe for some kind of fruit the cool chambers can well be dispensed with, provided care is taken in selecting the kind of fruit, in not overlooking the best time for picking, in grading, wrapping, packing, and handling the produce. Now that it will be possible to put the fruit on board the fast mail steamers at Fremantle, it is more than likely that it will be possible in the case of the best keeping fruit, to considerably reduce the high freight charges which often absorb the profits of the shipper.

The following is Messrs. Keeling and Hunt's report under date 19th June, last, to Sir Edw. H. Wittenoom:—"In accordance with your request we have examined the 12 boxes of apples and pears, ex 'Cuzco,' and now beg to report as follows": Cases 1, 2 and 3 'Rome Beauties,' Mr. Chas. Harper, Woodbridge. This apple is of good appearance and good quality and is quite suitable for shipment to London. Cases Nos. 4 and 5 'Stone Pippins,' Mr. Chas. Harper, Woodbridge. A good hardy apple in every way, suitable for shipment. N.B.—No. 4 was received in very slack condition. Case No. 6 'White Winter Permain's' from same source; a good hardy apple, admirably adapted for shipment to England. Case No. 7 'Shockley,' Mundaring Vineyard Co. A handsome apple, but this sample consisted of very small fruit. A rather larger size is more suitable. Case No. 8, Silbert and Sharp. Variety not named, but we classify the apples as 'Stone Pippins.' This sample was very good, but the fruit was small. Case No. 9, Silbert and Sharp. Variety not named, but practically the same as No. 8. Case No. 10, Silbert and Sharp. Variety not named. At first we thought these apples were Dunn's Seedlings, as they were large and soft, but on second thought we are inclined to call them 'Stone Pippins.' This fruit was rather too soft for shipment. All these were packed rather loosely, but as you are sending all the apples away, we did not turn the fruit about more than we could help. Cases 11 and 12, 'Napoleon Pears' (Silbert and Sharp). This fruit, although carelessly packed, has travelled very well, but we could not advise large shipments of pears at any time. Seeing that these pears have arrived fairly sound, it might be thought that we should modify our previous opinions, but we are not disposed to do so, and before recommending the shipment of pears, we should want to see several samples arrive sound."

The London papers generally speak in the highest terms concerning the quality of the West Australian fruit exhibited at the offices of the Agent-General. The *Chronicle* is responsible for the statement that, "on one farm of 160 acres, visited by the Minister of Lands (Mr. Throssell) during the past year, the owner had cleared a profit of over £3,000. That is the area of land that under the present law may be taken up by a *bona fide* settler in Western Australia."

VISIT TO COOLGARDIE.

THE COOLGARDIE SHOW.

Mr. Crawford, of the Department of Agriculture, who visited the Coolgardie Horticultural, Dog, and Poultry Society's show, recently held at Coolgardie, reports to the Department:—

According to instructions. I went to Coolgardie Horticultural, Dog, and Poultry Society's show, taking with me various exhibits, consisting of models of fruit, etc., grown in the colony, photographs of orchards, vineyards, farm scenes, and land before and after clearing, from different parts of the colony. I took various bee-keeping appliances, and some live bees, showing the modern and proper system of bee-keeping; also an exhibit of various kinds of local timbers, supplied from the Forestry Department, with literature describing their uses. From the Lands Department I had a very fine map of the S.W. portion of the colony, showing all the agricultural areas and the various kinds of soils, timber, etc.; also a collection of the litho. plans of the various agricultural areas of the colony. On these I wrote in large letters the terms on which the land could be secured, and headings to catch the eye, such as "Fine Potato Land," "Heavy Rainfall," "Heavy Crops," "Splendid Wheat Land," etc. These plans, so marked, I then put up all round the halls and rooms that I occupied, and they attracted great attention. At Coolgardie I was kept busy for two solid days and nights explaining the land regulations, and what could be grown in the different areas; also giving approximate cost of clearing, fencing, etc., and the advantages of the Agricultural Land Bank. Those who seemed to want land I gave the book on land selection published by the Lands Department, and all other information I could. The value of the exhibit was much enhanced by a selection of exhibits sent to me by Mr. Ranford, the Government land agent at Katanning, consisting of flour, bran, pollard, wheat, hay in sheaves, chaff, and vegetables, all grown in the district, and exhibits of barley, wheat, and chaff from Mr. Conway, manager for Messrs. Dalgety and Co., at Wagin. On two evenings I gave a limelight exhibition of various farm scenes, vineyards, orchards, and land cleared and uncleared, starting at Dongarra in the north and down to Busselton and Katanning in the south and Northam in the east. These views were an eye-opener to most of the people there. They had no idea that such land and crops existed in the colony, and each night the hall was crammed, at least 500 to 600 people being present. At Boulder City the interest was even greater than at Coolgardie, and from morning to night there was a constant stream of people wanting information about land, and where and on what terms it could be obtained. The ignorance of the people regarding anything pertaining at all to the land was remarkable. Most of them seemed to take it for granted that the regulations were similar to those of New South Wales and Victoria, where personal residence is in most cases compulsory, and the price is 20s. per acre, with 20s. per acre improvements, or 40s. if non-resident. The majority of inquiries were from working men earning good wages at the present

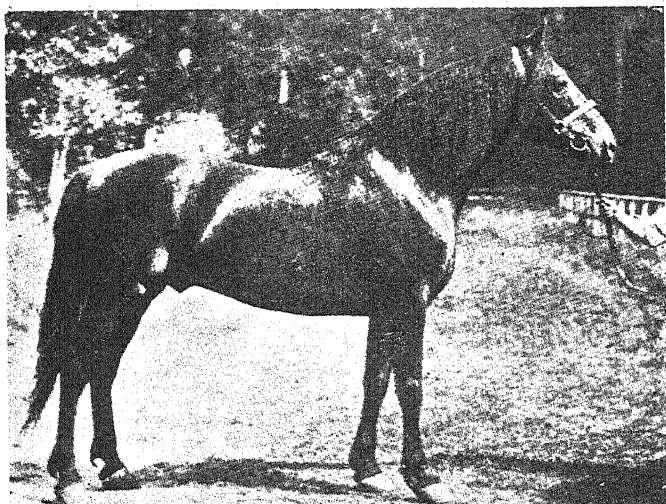


FIG. 10—Cleveland Bay Stallion.

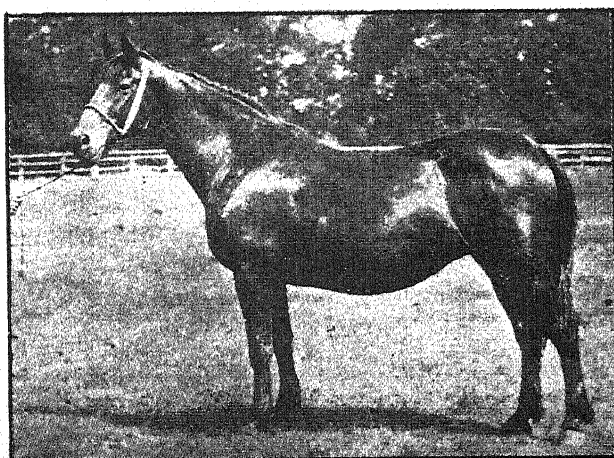


FIG. 11—Cleveland Bay Mare.

time, and many said, if they had only known, they would have brought their wives and families over, and put them on land, and paid a man to improve it. Others, who had their wives and families here, said they would take up land and put their families on it, and they would remain on the fields, where they could make good wages, and afford to pay for getting work done, and they would then have a place they could call a home. Several wanted me to mark out blocks for them, and would have paid half a year's rent on the spot, but, of course, I could not do that, as I did not know what blocks were open; neither would I care to take the responsibility of doing so. Three at Boulder said they needed a holiday, and would take one next week and have a look at some of the land, two at Doodlekine and one at Udic, near Harvey. Many wanted me to go to Kalgoorlie, but the hall there was not obtainable just then, and the federation question was too much to the front to do much until after polling day was over. The bees attracted much attention, and many expressed their intention to try and keep bees on the fields. There seems to be no reason why they should not succeed, especially where the scrub is abundant.

POULTRY ON THE FARM.

BY A. CRAWFORD.

Those who intend hatching chickens this season should make preparations for doing so at once, if they have not already done so. Early hatched chickens are more profitable in every way, whether for laying, killing or showing. They lay at an earlier age and grow quicker and larger.

On a farm where a lot of mixed poultry are running about, there are always certain to be found good, bad, and indifferent among them, consequently the eggs from such a mixture should not be set. The best way to do is to pick out half a dozen of the best hens and get a pure-bred cock not related in any way to put with them. These should be shut off by themselves, and only the eggs from them set. The choice of the cock would depend on what was required, eggs or table fowls. If for eggs, any of the following would answer:—Leghorns, Minorcas, Andalusians, Spanish or Hamburgs. If for table: Dorking, Malay, Indian, English, or Australian Game.

If general purpose birds are required, Wyandottes, Orpingtons or Plymouth Rocks may be used with profit.

Many persons will tell you that the common barn-door fowl is the best, but that is against actual facts. No common barn-door fowl will approach some of the pure breeds for laying purposes, neither can you get the weight on them.

Make up your mind what you want, eggs, table fowls or general purpose birds, and breed intelligently towards that end, with pure-bred birds, at least, on the male side, and the poorest flocks will greatly improve in a single season.

Get rid of your old birds, in fact, there should never be an old bird on the farm, nothing over $2\frac{1}{2}$ years should be kept, unless it is some particularly good bird for breeding purposes. It is often said that it is hard to tell which are the old birds and which are the young. That difficulty is easily overcome by marking the chickens when young. There are many ways of doing this, but a rough and ready and effective way is to cut the first joint of one toe, say, this year; next year, the first joint of the next toe; following year, the joint of the third. After that, commence over again. By that method the age of any fowl can always be told up to three years, and none of that age should be found about the place. If the operation is done with a sharp pair of scissors when the chickens are very young, it heals up almost at once and does not seem to inconvenience the bird at all.

INCUBATION.—The question with many is, which is the better, to use the hens or an incubator? If it is desired to rear many chickens I should undoubtedly say use an incubator. The advantages are many: some of the principal ones are: There is no waiting for broody hens; it is difficult to get broody hens at the time when the eggs ought to be set; a large number of eggs can be set at one time and a large number of chickens reared together; these require very little more time to attend to than a few would; a great saving in chicken feed—if the chicks are fed with the hen she often eats three times as much as the chickens do. When this consists of hard boiled eggs and oatmeal it becomes rather expensive feeding; but what is perhaps the greatest advantage of all, is, the chicks can be reared totally free from lice and all vermin if the foster mother is kept clean. Chickens so reared will grow much faster and larger than those that have vermin on them, and with hens it is almost impossible to rear them free. Incubator chicks are also more free from disease. Of course there are incubators and incubators, some are not worthy of the name, while with others better results can be obtained than with hens. It is bad policy to try and save a few shillings in the purchase of one. Good second-hand machines are often available, but in purchasing such, the tank should be carefully examined to see that it does not leak. An iron tank will seldom last more than three seasons. When purchasing an incubator, a copper tank can generally be obtained at an extra cost, and it will practically last a life time, the extra cost is more than repaid a dozen times over.

Where the number of chicks to be reared is only a few, hens do very well, but even then it is better to use a foster mother than to let the hens rear them; and a foster mother does not cost a great deal, in fact a handy man, or woman either for that matter, can easily make one out of a kerosene tin or by using a lamp in a box. The foster mother should always be made so as to be easily cleaned, a great many of those now in the market are awkward to clean and should be left alone.

If a hen is used for hatching the chicks and a foster mother for rearing them, the chicks should be removed from the hen as soon as possible after coming out of the shell and put into the mother. Lice

and other vermin can be kept under to a great extent in the setting hen, with a little care and precaution. The nest should be made on the ground under cover from wet; a hollow is made and some fine ashes put in, and over that some chopped up or short straw. If the weather is hot or dry when the hollow is first made, it should be filled with water several times so as to let the ground get thoroughly damp. When the hen is about being set, sprinkle some sulphur on the nest and put two or three naphthylene balls or some camphor in it also. This will kill most of the vermin on the hen when she is sitting.

COLD STORAGE OF EGGS.

BY F. J. GRESHAM.

The value of cold storage as an aid to profitable poultry farming is now recognised all over the world. Eastern Australia for a year or two has been demonstrating the fact that a careful and judicious use of cold storage means a profit of 50 per cent. to 100 per cent. on the year's income from the poultry yard. As many as 100,000 dozen of eggs have been stored at one time in a neighbouring colony, and with satisfactory results to the owners. In the Government Refrigerating Works, Wellington-street, Perth, the farmers of Western Australia are provided with the means of increasing their incomes, by reducing waste to a minimum. One hundred and seventy thousand people in Western Australia are daily waiting to be supplied with eggs. But it happens frequently that the price of eggs puts them amongst the luxuries rather than amongst the ordinary articles of diet. To keep the market regularly supplied and in normal condition, is more profitable to the egg producer than periods of plenty alternating with seasons of scarcity, the judicious use of the Government Refrigerating works, would regulate the market supplies at little expense and no extra labour to the farmer. Eggs (infertile as far as possible) should be placed in the storage box in a cool place early every morning as they are gathered. Cleanliness, and proper grading as to size and color are two essentials in obtaining best prices. The owner can exercise free will as to packing and size of case, but uniformity is a desideratum, and the best results have been obtained from cases holding 20 dozen, fitted with card board fillers and packed without husks. The greatest care should be taken to see that the "fillers," and the timber of the cases are thoroughly dry and odorless, otherwise the eggs will become affected. The shortest route and quickest method of transport should be adopted when consigning eggs to the stores. All railway and other charges should be pre-paid, as the department does not pay any freights. A small charge will be made for receiving and storing eggs, which requires to be paid before delivery is given, and no delivery can be given except on a written order from the owner. An advice note should be forwarded to the manager as soon as the goods have been consigned.

“BLACK SPOT” OF CITRUS FRUITS.

The Viticultural and Horticultural Expert of the Department of Agriculture reports as follows :—

“RESTRICTION REGARDING IMPORTED FRUIT IN VICTORIA.

To the list of plant diseases, the introduction of which in Victoria is prohibited, has now been added the fungus disease (*Phoma citricarpa*, M'Alpine) known as Anthracnose or “Black Spot” of citrus fruit. This blight has been proclaimed to be a disease within the meaning of the Vegetation Diseases Act of Victoria, and the Minister of Agriculture in Sydney has been advised by the Victorian Government that in future oranges and lemons affected with this fungus will not be admitted into Victoria.

I beg, likewise, to recommend that this disease be placed on our prohibited list. I have not yet observed it in Western Australia, where its introduction amongst our orange groves would prove pernicious.

For the information of growers, and also of the officers in charge of the disinfection sheds at the ports of entry, I reproduce a plate from Mr. D. M'Alpine's Monograph of Fungus Diseases of Citrus Trees in Australia, together with a summary of the description which accompanies it.

The disease, it is stated, has not been met with in Victoria, but it is quite common on oranges, mandarines and lemons sold in Melbourne and suburbs, and imported from Sydney.

It spots the fruit, the spots are round and sunken and of a dark brown colour, at first, whitish or greyish towards the centre. These are pustules which allow the escape of spores, which may be wafted by the wind, or carried by hands, clothing, insects, animals, or empty cases. Thus is the disease rapidly and widely spread.

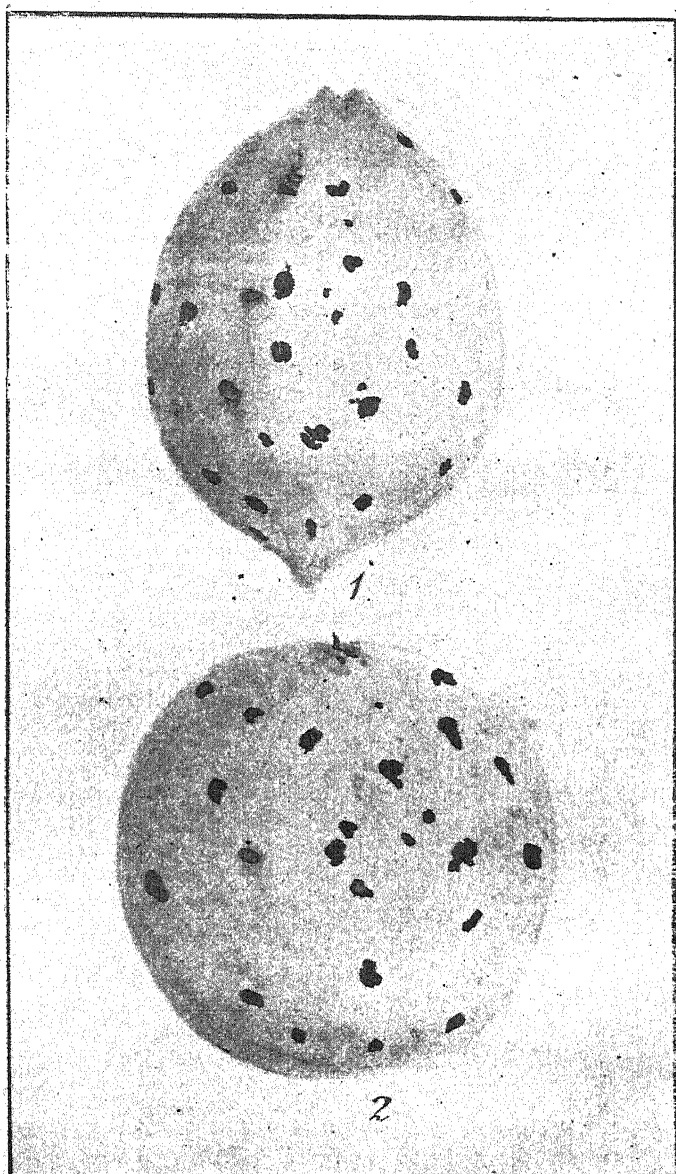
It bears some resemblance with another black disease of citrus fruit called “Melanose,” and also with a disease known in Italy as “La Nebbia,” which is, however, caused by a different fungus.

The effects of the disease on the fruit is, that besides being unsightly and rendered almost unsaleable, they soon become rotten and fall a ready prey to “Blue Mould,” etc., so that all such should be rigidly excluded from shipments to distant markets.

The fungus is found on still green fruit, and spreads most rapidly when the fruit ripens.

TREATMENT.—The skins of diseased fruits should be burnt in order to prevent the spores reaching fresh growing fruits. The cases containing diseased fruit should be disinfected by steaming or by dipping in boiling water for a few minutes. Spray the trees with Bordeaux Mixture as soon as the fruit sets, and again every few weeks up to about a month of the time of picking the fruit.”

(In connection with the above report, the Executive Council have prohibited the importation of any fruit affected with this disease, and a copy of the *Gazette* notice to this effect is published in this number of the JOURNAL. A plate is also inserted showing (after McAlpine) the characteristics of some citrus fruit affected with the disease.)



Black Spot on Citrus Fruits.

INSPECTING FOR PHYLLOXERA.

The *Journal of Agriculture* of South Anstralia for June says :—The Phylloxera Board has now been in existence for some months, and has put into working form the machinery for the inspection of our vineyards. It has constantly been thrown in our teeth by our neighbours that, although we called ourselves a clean colony so far as the phylloxera was concerned, we had not proved the fact by a systematic inspection of our vineyards. It was even hinted by some (who ought to have known better) that the pest might have been imported into the other colonies from South Australia. Without inquiring whether such insinuations were prompted by ignorance or spite, it will be sufficient to say that if the phylloxera has been in our midst for the last twenty years it has lost all its venom and destroying power under our benignant climate. It must be recognised, however, that not for the sake of gratifying the curiosity of our neighbours, but for our own protection, a periodical systematic inspection of our vineyards has now become absolutely necessary. The struggle against the pest is now practically being abandoned by Victoria, and in a short while it will be bred in millions on the American resistant stock. Our present immunity is seriously threatened, and at any time the disease may be introduced in our midst. It is imperative that we should discover centres of infection as soon as they appear, and this can only be done by an efficient inspection. It is satisfactory to know that with the close of the inspecting season, the inspectors had discovered no signs of the dread disease within our territory.

GOVERNMENT REFRIGERATING WORKS.

These works have recently been taken over by the Department of Agriculture, and considerable alterations and improvements have been made, which will make the stores much more convenient. It is hoped that they will prove of great advantage to the agriculturists of the colony by enabling them, at a small cost, to store their perishable produce until such time as a suitable market can be found, instead of sacrificing it at low prices or allowing it to rot.

The manager, Mr. J. Gresham, reports as follows :—Extensive alterations are almost completed whereby throughout the summer weather the trader in meat, milk, butter, eggs, poultry, fruit, etc., may have his produce protected and his profits augmented. Stores have been erected to serve the requirements of the retail as well as the largest wholesale dealer—the producer as well as the merchant. The stores are well lighted by electricity, and ample hanging accommodation has been provided. Reasonable rents have been fixed, and the utmost privacy assured. Each lessee will control his own space, and have the greatest freedom of access possible, subject only to the absolutely necessary regulations which have been framed for the proper management of the works and the protection of the produce stored. Country producers can use the stores as freely and conveniently as lessees in the city. A written order from owners of produce

stored in the works, presented to the manager by their customers, will be sufficient authority for delivery of goods after all charges have been paid. The works are in direct communication with the railways, and goods addressed to the care of the manager Government Refrigerating Works Siding, Perth, will reach their destination safely and expeditiously if the freight has been prepaid by the consignor. A copy of the regulations, together with any other information, can be obtained on application to the manager.

BEE KEEPING.

BY A. CRAWFORD.

SEASONABLE NOTES.

At this time of year, if the hives have sufficient stores, the less they are disturbed the better. The hives should not be opened on a damp or cold day. If the matter of stores is doubtful, on a fine afternoon open up the hives and see if they have stores enough to last them until spring. If they have not, they will require to be fed, this can be done either by putting in a frame or two of honey from some hive that can spare it, or if there is none available, by feeding them with syrup. This is made by putting one pint of water with $2\frac{1}{2}$ lb. of white sugar in a saucepan, and heating slowly until near boiling; keep it well stirred so as to prevent burning. This can then be given either in a proper feeder at the entrance to the hive at night, or fed to the bees inside the hive on comb, or in jars, or in wide mouthed bottles inverted. To feed on comb pour the syrup from a height of about two feet unto the empty combs, this will force it into the cells, and then put the comb thus filled into the hive. To use a jar or bottle, tie some muslin over the mouth, and place two small sticks at the bottom of the hive, a little distance apart, and insert the jar, placing the mouth of it on the sticks, the bees can then extract it through the muslin. Some prefer to feed candy instead of syrup, and place it on top of the frames. To make the candy take 5 lb. of sugar and boil it with one pint of water, keeping it stirred until it is tough enough to be drawn into threads, then pour it into well greased moulds, or on to well greased paper. When cool the cake is placed on top of the frames. A useful, stimulating food, to encourage breeding is made by adding some flour or pea meal to the candy when making it, this takes the place of pollen. If the syrup or candy should get burnt, do not give it to the bees, as it acts as a poison.

Complaints keep coming to hand from various districts about the ravages of the wax moth. It can be kept under by doing away with the black bees. Keep either pure Italians or hybrids, and if they have anything like a hive in fair condition they will defend themselves.

Those who keep bees in boxes without moveable frames will never make a success in beekeeping. Bees thus kept are not profitable to the owner, and may be a source of infection to all the bees in the district. One box framed hive will give better results than half-a-dozen kept in kerosene cases.

GREAT SOUTHERN DISTRICT.

Inspector Vaughan, of the Department of Agriculture, who is paying a visit of inspection to the country districts, has sent the following report to the department:—

The farmers around Wagin are using all their energy in putting their crops in, and a large quantity of new land will be under cultivation this year. I was very much struck with a splendid sample of malting barley shown me by Mr. Conway, manager of Messrs. Dalgety and Co.'s farm. He told me that a sample was sent home to a firm of Scottish distillers, and was spoken of very highly, thus proving that the Wagin district is very suitable for the production of this cereal. Mr. Conway is sowing wheat, barley, rye, and oats, the latter a splendid sample of Algerian oats, especially imported by Messrs. Dalgety and Co. He is a great believer in first-class stuff, and to produce this he goes to a lot of trouble in treating the seed. As he takes the same trouble with his land cultivation, harvesting and putting on the market, he gets what he wants—only first-class samples. Last season 80 acres sown for hay returned 80 tons. He also showed me a piece of land which, with his usual care, he is sowing with Sea of Azof barley, supplied to him by the Department of Agriculture. I should like to mention that he is a great believer in grasses, and thinks that the future of the agricultural country is wrapped in their successful cultivation. A variety of wheat which he showed me, known as Early Morn, averaged 18 bushels.

Fruit-growing along the Great Southern railway has hardly got the recognition that it deserves, thousands of acres along the line being suitable for fruit and vine-growing. The land can be got from the Government on the most liberal terms, and the clearing is very light. The climate is all that can be desired, with a good rainfall, and absence of hot winds in summer. Most farmers are planting an acre or two of trees, but only for their own use, and not as a source of profit, which is a mistake, as most people recognise in these days that mixed farming is the thing to go in for, and feel sure that a five to ten-acre orchard of a good-keeping variety of fruit will help to keep the banking account on the right side of the ledger. Growers should pay more attention to the condition of their land before planting. They will save in the long run by fallowing the ground for a year, unless it has been fallowed for a year before, and the next year give the ground a good deep, ploughing; or, better still, sub-soil, and with a good winter and summer cultivation, they will have good healthy trees. There are too many stunted trees about, and it is simply through the soil not having been properly prepared before planting, and bad cultivation. Orchards like those of Messrs. F. and C. Piesse, E. R. Buck, Grover, J. C. Cook (of Katanning), J. F. Vanzuilecom, Watts (Kojonup), W. Piesse, O. R. Taylor, C. Piesse, Gell, G. D. Taylor, A. Cumming, and W. H. Lilley (Wagin) do credit to the growers and justice to the land. Apples, pears, and stone-fruits grow to perfection in these districts, and when the possibilities of the land are better known, fruit and vine-growing must develop into one of the staple industries. Wineries and canning works will be established, besides an export trade of fresh fruit.

ANSWERS TO CORRESPONDENTS.

Mr. R. Gordon, Tyrone Vineyard, writes: Kindly let me know the best method of destroying lice on pigs? Lice on swine are generally caused by poverty or through the stock being badly kept. The best remedy is: Pour about one gill of kerosene oil in any old dish, and with a paint brush or old woollen rag rub the oil up and down the back of the animal, behind the fore-legs, and on the flank; be particular about the last two places, for it is where the lice deposit their eggs, which, if not destroyed, will hatch out in about five days. If it be a black pig, these eggs can be plainly seen, being about the size of timothy seed, and laying close to the skin fast to the hair. You need not fear to use the oil freely, as it will not injure the pig in the least.

Mr. G. M. Richardson, Wooroloo, writes as follows:—One of my Wyandotte pullets consistently refuses to shell her eggs. For over a month she has visited the nest with the best of intentions, but without results. We have supplied lime, dosed her with superphosphate, fed crushed bones, etc., all without improvement. At the same time you might inform me of the proper colour of the Indian Runner Drake; also, would ducks lay better with the run of a swampy patch peopled by tadpoles and frogs than fed on a grain and cake ration? The above inquiries were submitted to Mr. A. Crawford, the poultry expert, who replies as follows:—When soft eggs do not occur from a total absence of lime, the most frequent cause is over-feeding. When the egg is complete without the shell, it will generally be sufficient to miss a meal a day, or feed very sparingly, and let the grain be so distributed, that the hen will have to work for her living. If the hen is inclined to be egg-bound, Tarter pills should be given, three or four at intervals of four hours, composed as follows:—One grain of calomel, one twelfth of a grain of Tartar emetic, and one quarter of a grain of opium. Keep the bird for a few days on soft unstimulating diet. Indian Runner Ducks (colour of the drake): I am not certain as to the proper colour. The ones I got from New South Wales had brown heads and dark cinnamon-coloured bodies. The one from Rounseval, South Australia, had green head and body something the colour of Rouen. The former were from birds imported from England, and the latter from birds imported from India. With regard to the last query, I think the birds would probably do better with a run of swamp with a light grain ration at night. There may be loss of eggs through not being able to find them.

Mr. W. M. Parker, York, writes as follows:—There are some farmers who are suffering from too much water remaining upon parts of their fields. Now, for general information, I must say that some years ago when I was in business, I had about two acres in one corner of a 25-acre field which suffered from too much water lodging on the surface, which caused the wheat to perish, leaving only a poor growth of water grass. Therefore, I had a 3ft. drain dug all the length of the wet ground, with branches extending to the right and left in order to collect all the water. The drain was then filled in with light timber and bushes lengthways, to a depth of 2ft., and covered with leaves or straw to prevent the soil falling through, and then a foot of soil filled the trench to the surface, when the plough could safely pass over it. The following year the wheat was all up level over the whole field, which produced upon an average 25 bushels per acre. The 50 bushels gathered from the two acres which had previously been useless more than compensated the expense of forming the drain. [The Department is continually advocating the drainage of land in the columns of the JOURNAL.—Ed.]

Mr. J. D. Hammond, Beverley, writes as follows:—I note with pleasure your decision to have an Inquiry Column in the JOURNAL. I enclose a question. With a view to adopting the 2-bushel bag in the place of the unwieldy 4-bushel bag for grain. Would the Department obtain the price, delivered at Fremantle, for 2-bushel bags? [Perhaps some of our wholesale merchants will quote for these, as there is likely to be a considerable demand.—Ed.]

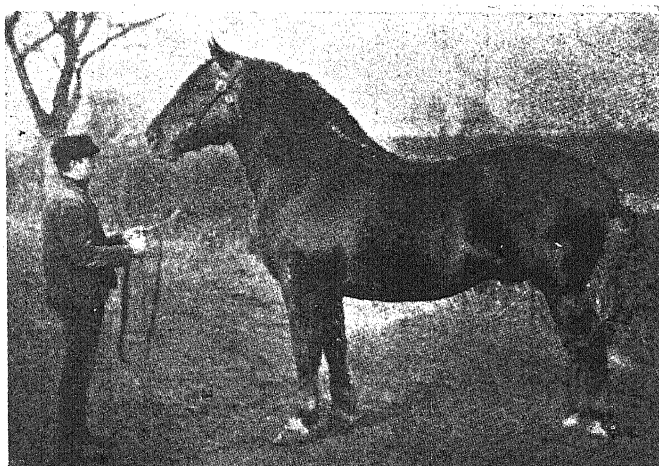


FIG. 12—Suffold Punch Stallion.

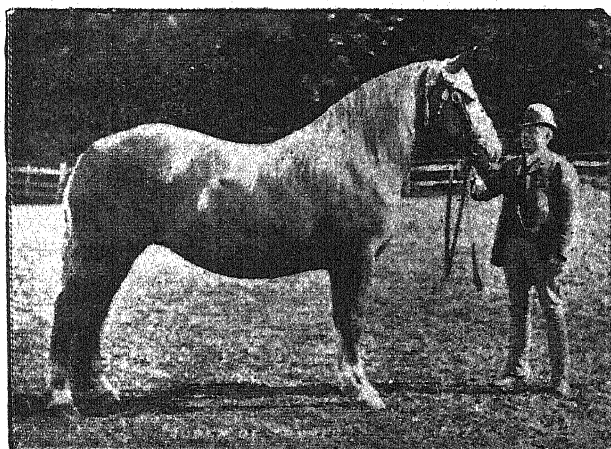


FIG. 13—Suffold Punch Mare.

MARKET REPORT.

FOR WEEK ENDING AUGUST 9TH.

The West Australian General Produce Co. report sales effected for the following articles on account of various consignees, for the month ending August 9th, 1900:—Sales effected during the past month have been very satisfactory, considering the wet weather. The federation question has had its share in interfering with business, but now that great question is settled, perhaps not in such a satisfactory way as our producers and manufacturers would have liked, still our farmers will accommodate themselves to the new change, and philosophically do the next best thing. Bacon, owing to the short supplies of eggs, has been rather slow selling, but now the eggs are coming in more freely the sale will increase. The same applies to the sale of hams. Butter, the values unaltered with market a little unsteady, good enquiries for first class local butter. Lard, in bladders and tins, usual sale. Cheese in fair demand, but inclined to be scarce on spot. Local eggs are coming in more freely, but the demand exceeds supplies. Imported eggs, according to cable news, are decreasing rapidly in value, which indicates a considerable fall both in Adelaide and Melbourne. Onions have risen about 30s per ton in the Eastern colonies, during this week stocks on spot very light. Potatoes, local are arriving in fair quantities, and are preferred to the imported. Imported potatoes have been scarce, but a few consignments have been landing during the last few days. Chaff, consignments have ceased somewhat, owing to the wet weather farmers have been unable to deliver them at country stations. Bran supplies on the increase owing to oil cake having taken its place in cattle feeding. Pollard continues being in demand. Wheat, very little local offering, though several lots of N. Z. are relieving the wants of the local market. Oats have had another sharp rise, several shipments have been bought up for the military authorities in China. Fruit continues scarce, especially bananas, varieties being limited, mostly confined to oranges and lemons. Pork, from 50 to 90 lb. weight finds ready sale, also hindquarters kangaroo, in fact all kind of carcase meat. Poultry, a good demand for young, full grown, table birds, ducks in particular. Bags, great rise expected, owing to the disturbance in the far East. Vegetables of all kinds scarce, likewise salads. Good demand for dried herbs off stalk. Farm and Dairy Produce.—Bacon, sides, case lots, 9½d to 10d, flitches 9d to 9½d lb; hams from 10½d, 11d, 1s, 1s 1d, to 1s 2d lb; butter 1s, 1s 1d to 1s 1½d, others from 11d lb; lard, in bladders 8d, tins 9d lb; cheese, case lots, loaf, 9½d to 9½d; eggs from 1s 10d to 2s 2d doz; potatoes, imported, £6 10s to £7 ton, local, new, from £6 10s £8 to £8 10s ton; onions, £7 to £7 10s; chaff, nominally £6 15s to £7 10s; hay and straw worth from £5 10s to £6; bran, £6 17s 6d to £7 2s 6d; pollard, £7 5s to £7 10s; flour, local, sacks, £9 5s to £9 10s, quarters, £9 10s to £10; oats from 3- 3d to 3s 6d; maize, whole, 5s 6d to 6s 6d bushel; wheat, 4s 3d, 4s 6d, to 4s 9d bushel; oil cake, £7 ton; peas, dry, 5s 6d to 11s bushel. Fruit—Oranges, local, from 6s to 13s case; lemons, local, from 4s, 6s, and up to 7s case; mandarines, local, from 16s, 22s to 25s case; bananas, worth from 22s 6d to 30s case; passion fruit, worth 14s, 16s, 18s case; cape gooseberries, worth 4d lb; apples, nominally, 18s to 25s case. Vegetables—Cabbage, 8s, 10s to 14s cwt; cauliflowers, 1s to 10s doz; carrots, 2s doz bunches; parsnips 1s 6d to 2s doz bunches; turnips, white, 2s doz bunches, bulk, 5s cwt; Swedes, 6s to 6s 6d cwt; rhubarb, 1½d, 2d to 3d lb; capsicums and chillies, 1s lb. Salads and Herbs—Lettuce, worth 8d to 1s doz; spring onions, worth 1s 6d to 2s doz bunches; beetroot, worth 2s to 2s 6d; celery, worth 2s to 3s 6d doz heads; cress, worth 4d doz bunches; thyme, marjorum, sage and mint, off stalk, 1s lb; sweet basil, sweet fennel, 1s 6d lb, off stalk. Poultry—Fowls, young, full grown, heavy, 5s, 6s 6d to 7s pair, others 3s 6d, 4s 6d to 5s 3d; ducks, good, 7s, 8s to 8s 6d; geese, worth 10s pair; turkeys, gobblers, 18s, 22s 6d to 24s, hens, 12s, 14s, 16s to 18s. Game—Kan-

garoo meat and kangaroo tails, 2d to 3d lb. Carcass meat—Pork, 50 to 90 lb, 6½d to 7½ lb; mutton, worth 8d lb; lamb, worth 8d lb; beef, sides, worth 6d lb; veal, worth 8d lb. Sundries—Bonedust, from £6 10s to £7 ton; phosphate, £4 10s to £5 10s ton; superphosphate, £6 10s to £7 ton; guano, phosphatic, £3 15s to £4 10s ton; guano, ammonical, £6 ton; coarse bacon salt, £3 ton; new corn sacks, 7s 6d doz, secondhand, 4s; new bran bags, 4s 7d to 4s 9d, secondhand, 3s.

THE WEATHER DURING JULY.

The weather during the first three weeks of July was, on the whole, beautifully fine, with high barometers, broken by the passage of a "low" on the 6th and 16th. The rain accompanying these "lows" was rather heavy, but of short duration, and the anti-cyclonic weather was of the usual winter type, clear, bright, crisp days, with light easterly winds, and calms and cold frosty nights.

On the 21st, however, the barometer once more commenced to fall rapidly, and this was found to precede a remarkably severe storm. The centre must have been very close to the Leeuwin, passing just south of there about 6 p.m. on the 22nd, or probably a little later. The fall was so rapid, and the reading at 6 p.m. so unusually low, that the following figures will be interesting:—July 21, midnight, 29.806; July 22, 2 a.m., 29.718; July 22, 4 a.m., 29.643; July 22, 6 a.m., 29.489; July 22, 8 a.m., 29.351; July 22, 10 a.m., 29.212; July 22, noon, 28.950; July 22, 2 p.m., 28.927; July 22, 4 p.m., 28.846; July 22, 6 p.m., 28.687; July 22, 8 p.m., 28.750; July 22, 10 p.m., 28.937; July 22, midnight, 29.110; July 23, 2 a.m., 29.218.

The greatest velocity of the wind recorded was 85 miles per hour, after which the anemometer was blown away. The great S.W. jarrah forest gave evidence of the most severe storm that the residents have ever experienced, the giant trees being uprooted in every direction, one in particular measuring 40ft. at the base, and rising with a trunk perfectly clear to a height of 180ft. before the first branch was reached, the circumference at that point being 16ft. After passing the Leeuwin, the centre of the storm must have also passed very close to Albany, probably to the north of the town. Of this, however, we are not quite certain, owing to conflicting evidence. At Breaksea Island, where the direction of the wind is read every few hours, it was reported as N. 6 (Beaufort scale) at 8 p.m. on the 22nd, S.W. 2 at midnight, S.W. 5 at 4 a.m., 23rd, E.S.E. 10 at 8 a.m., and S. 12 at noon. The lowest barometer, 28.914, occurred at midnight, 22.3. From Albany, on the other hand, the following was reported:—"During Sunday morning (22nd) there was a slight breeze from the N.E., and towards the afternoon it veered around more easterly; then the glass had fallen to 28.91, which was the lowest reading. At night the breeze increased, and by midnight it was blowing very fresh from E.S.E. At 2 a.m., 23rd, the wind came up in hard squalls, with rain, from the south, and it steadily increased till at 10 a.m. it was blowing a strong gale from that quarter." The storm, after passing Albany, pursued its way, as usual, towards the south of Tasmania, and the weather remained showery in our S.W. district till the end of the month.

Compared with last July, the climatological map shows that the barometer was slightly lower this month, and the temperatures also, both day and night. Compared with June, a considerable fall of temperature is noticeable, especially inland at night. This has been largely due to the anti-cyclonic weather during the first three weeks of the month.

The rainfall throughout the colony has been, on the whole, about an average, except in the tropics and the extreme S.W., where it has been considerably in excess of the mean for previous years.

THE CLIMATE OF WESTERN AUSTRALIA.

DURING JULY, 1900.

FROM TELEGRAPHIC REPORTS.

LOCALITY:	Barometer (corrected and reduced to Sea Level).		Temperature.			Rainfall.	
	High- est.	Lowest.	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	30.188	29.897	74.8	92.5	57.0	26	1254
Derby	131	829	69.6	88.3	47.8	30	1407
Broome	163	817	66.9	84.4	50.0	139	1810
Condon	280	886	59.8	79.0	39.0	90	1872
Cossack	257	832	62.0	84.4	47.4	159	4001
Onslow	221	839	60.7	75.5	41.0	106	2687
Carnarvon	261	865	58.7	73.2	43.0	103	1400
Hamelin Pool	287	842	56.6	73.0	37.0	102	690
Geraldton	420	738	58.4	71.6	43.0	410	1720
Hall's Creek	216	777	63.0	92.0	38.0	116	1459
Nullagine	240	780	57.8	72.0	32.5	100	1548
Peak Hill	380	833	51.8	69.1	36.2	55	2435
Lake Way							
Cue	429	782	52.0	65.8	35.2	112	1892
Yalgoo	451	771	51.8	67.6	33.0	46	9089
Lawlers	546	644	50.2	65.3	31.6	90	1364
Laverton	496	677	50.4	67.8	32.0	63	1432
Menzies	557	537	50.1	64.1	34.9	67	996
Kalgoorlie	586	409	50.2	67.2	35.9	46	870
Coolgardie	597	371	49.8	66.7	34.0	58	749
Southern Cross	568	454	49.2	63.6	30.0	51	756
York	563	521	50.2	66.0	31.5	327	1348
Perth Gardens	525	495	54.6	67.8	40.0	536	2222
Perth Observatory	525	494	55.0	67.6	40.2	558	2278
Fremantle	501	467	56.6	69.0	44.2	483	1704
Rottnest	474	426	57.2	66.0	46.4	506	1729
Bunbury	540	531	54.6	70.0	37.8	629	2709
Karridale	540	089	52.8	68.2	31.0	1058	3395
Cape Leeuwin	532	28.695	56.6	64.2	44.8	748	2820
Katanning	592	29.383	49.4	62.5	31.0	303	1204
Albany	578	110	52.5	66.8	38.2	412	2172
Breaksea Island	585	28.913	54.2	66.0	42.0	360	1677
Esperance Bay	597	28.967	52.3	66.8	35.0	372	1739
Balladonia							
Eyre	599	29.142	50.9	72.7	27.2	161	1054

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

TEMPERATURE OF THE SURFACE OF THE GROUND.

This important record has been overlooked in writing the weather notes for the last two months, but the number and intensity of frosty nights can be seen from the following table:—

LOCALITY.	MAY.			JUNE.			JULY.		
	Mean.	Lowest.	No. days 22 deg. or under.	Mean.	Lowest.	No. days 22 deg. or under.	Mean.	Lowest.	No. days 22 deg. or under.
Cue	44.4	32.0	1	44.5	33.5	0	37.8	27.8	2
Coolgardie	41.0	29.7	4	40.9	30.9	1	34.5	26.5	12
Southern Cross	37.8	28.0	6	40.8	27.8	3	36.7	26.0	14
York	41.2	32.5	0	43.8	34.2	0	36.0	25.0	9
Perth Observatory	45.8	32.2	0	48.7	37.4	0	42.6	33.2	0
Katanning	37.8	23.5	8	38.5	27.5	5	33.5	23.5	15
Karridale	37.0	24.2	10	40.2	23.0	3	37.7	24.5	5

**RAINFALL for June, 1900 (completed as far as possible),
and for July, 1900 (principally from Telegraphic Reports).**

STATIONS.	JUNE.		JULY.		STATIONS.	JUNE.		JULY.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	25	2	26	..	Millstream ..	172	3	..	..
6-Mile Hotel ..	53	1	..	..	Hong Kong ..	82	3	..	..
Carlton ..	..	..	..	..	Mallina ..	111	3	..	..
Denham ..	..	..	..	..	Whim Creek ..	156	5	257	8
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	104	4	180	4
Argyle Downs ..	..	..	..	..	Woodbroke ..	35	1	..	..
Lisadell ..	..	..	..	..	Croydon ..	146	5	..	..
Turkey Creek ..	10	2	98	3	Balla Balla ..	77	2	208	7
Ord River ..	11	..	123	..	Roebourne ..	67	5	178	5
Koojubrin ..	..	..	..	..	Cossack ..	114	4	159	5
Hall's Creek ..	14	..	116	..	Fortescue ..	89	6	84	5
Flora Valley ..	..	..	..	..	Mardie ..	158	6	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	225	3	..	..
Denison Downs..	..	..	..	..	Yarraloola ..	272	4	..	..
					Chinginarra ..	237	4	..	..
WEST KIMBERLEY:					Onslow ..	204	7	106	6
Obagama ..	..	..	..	..	Peedamullah ..	200	4	..	..
Derby ..	90	4	30	..	Clifton Downs ..	315	15	..	..
Yeeda ..	62	3	..	..	Red Hill ..	281	5	101	5
Liveringa ..	100	3	..	..	Wogoola ..	291	7	..	..
Mt. Anderson ..	..	..	..	..	Yanrey ..	293	8	..	..
Leopold Downs ..	..	..	..	..	Point Cloates ..	343	8	150	..
Fitzroy Crossing ..	6	1	252	5					
Quanbun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	399	9	143	6
Broome ..	143	5	139	..	Towara ..	333	8	..	..
Thangoo ..	48	3	..	..	Ullawarra ..	239	8	..	..
La Grange Bay ..	93	3	182	5	Woorkadjia ..	139	4	..	..
					Yanyearreddy ..	368	7	..	..
NORTH-WEST:					Williambury ..	443	8	..	..
Wallal ..	68	2	101	5	Wandagee ..	402	5	..	..
Condon ..	74	..	90	..	Boolathana ..	295	13	..	..
DeGrey River ..	36	3	..	..	Carnarvon ..	184	12	103	..
Port Hedland ..	106	4	133	5	Cooralya ..	252	8	..	..
Boodarie ..	130	3	..	..	Doorawarra ..	318	9	..	..
Yule River ..	..	..	..	..	Mangarra ..	354	15	..	..
Warralong ..	51	2	..	..	Errivilla ..	470	10	..	..
Muccan ..	27	3	..	..	Dirk Hartog Is. ..	376	22	..	..
Mulgie ..	56	3	..	..	Sharks Bay ..	262	14	78	6
Eel Creek ..	..	..	..	..	Meedo ..	283	12	..	..
Coongon ..	26	1	..	..	Wooramel ..	346	13	92	6
Warrawagine ..	67	1	..	..	Hamelin Pool ..	182	..	102	..
Bamboo Creek ..	80	3	184	5	Byro ..	278	12	..	..
Marble Bar ..	47	4	164	4	Berringarra ..	384	11	..	..
Warrawoona ..	76	5	200	5	Mt. Gould ..	389	..	84	2
Corunna Downs ..	42	2	..	..	Peak Hill ..	431	..	55	..
Nullagine ..	43	..	100	..	Abbotts ..	333	14	78	6
Tambourah ..	70	3	185	4	Belele ..	202	8	45	1
Mt. Florence ..	120	2	..	..	Mileura ..	295	8	..	..
Tambrey ..	98	3	..	..	Milly Milly ..	204	12	..	..

RAINFALL.—Continued.

STATIONS.	JUNE.		JULY.		STATIONS.	JUNE.		JULY.	
	No. of points. 100 equals lin.	No of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					SOUTH-WEST DIVISION, CENTRAL (COASTAL):				
Manfred ..	211	15	62	6	Gingin ..	1242	22	508	13
Mellya ..	310	18	..	..	Belvoir ..	942	22	439	12
Woogarang ..	168	7	81	4	Guildford ..	1099	19	559	14
Boolardy ..	261	10	..	..	Canning Timber Mills ..	1366	22	723	12
Wooleane ..	263	17	81	5	Canning Water-works ..	1177	24	713	16
Dairy Creek ..	110	2	..	..	Perth Gardens ..	1121	23	536	16
Murgoo ..	312	14	74	5	„ Observatory ..	1119	23	558	16
Mt. Wittenoom ..	..	..	127	6	Subiaco ..	1142	23	509	15
Nannine ..	277	10	45	..	Claremont ..	1034	24	563	16
Star of the East ..	294	11	1	1	„ (Richardson) ..	917	20	494	15
Annean ..	215	11	..	..	Fremantle ..	718	24	843	15
Tuckanarra ..	272	11	74	3	Rottnest ..	708	24	506	18
Coodardy ..	339	11	..	..	Rockingham ..	753	19	691	13
Cue ..	366	14	112	6	Jarrahdale ..	1445	25	884	14
Day Dawn ..	327	12	92	5	Mandurah ..	920	23	729	1
Lake Austin ..	272	17	103	4	Pinjarrah ..	1395	23	924	15
Lemmonville ..	308	12	112	7	Harvey ..	1458	25	698	18
Mt. Magnet ..	237	13	112	6	SOUTH-WEST, CENTRAL PART (INLAND):				
Challa ..	220	9	67	4	Goomalling ..	441	13	..	..
Youeragabbie ..	254	11	..	..	Culham ..	681	21	358	13
Murrum ..	..	..	71	5	Newcastle ..	796	19	437	12
Yalgoo ..	297	16	46	5	Eumalga ..	672	21	362	14
Gabyon ..	368	12	92	6	Northam ..	479	18	266	14
Gullewa ..	399	18	103	11	Grass Valley ..	517	18	204	10
SOUTH-WEST DIVISION (N'N PART):					Meckering ..	475	19	189	14
Murchison House ..	722	25	..	..	Doongin ..	300	13	110	8
Mt. Yuin ..	535	24	196	14	White Raven ..	303	15	186	12
Yuin ..	352	14	..	..	Sunset Hill ..	456	20	217	11
Northampton ..	946	17	308	12	Cobham ..	624	22	368	15
Mt. Erin ..	771	23	377	12	York ..	606	21	327	..
Oakabella ..	843	9	387	11	Beverley ..	548	15	222	11
Narra Tarra ..	585	11	347	9	Barrington ..	482	21	232	10
Mullewa ..	355	9	121	5	Sunning Hill ..	582	14	287	9
Bootenal ..	550	20	335	10	Wandering ..	1098	21	509	15
Geraldton ..	560	21	410	14	Pingelly ..	526	17	286	9
Greenough ..	724	20	489	..	Marradong ..	913	21	493	13
Dongara ..	661	23	327	16	Bannister ..	948	20	470	11
Dongara (Pearse) ..	673	21	316	14	Narrogin ..	525	21	249	13
Minginew ..	749	22	299	12	Wickepin ..	592	25	..	..
Rothsay ..	404	21	108	10	SOUTH-WEST DIVISION (S'N PART):				
Field's Find ..	346	13	56	4	Bunbury ..	1216	24	629	17
Carnamah ..	705	21	179	11					
Watheroo ..	617	21	280	11					
Dandaragan ..	720	24	371	15					
Moorra ..	587	23	247	13					
Yatheroo ..	779	23	396	17					
Walebing ..	688	24	290	15					
New Norcia ..	812	24	373	13					

RAINFALL.—Continued.

STATIONS.	JUNE.		JULY.		STATIONS.	JUNE.		JULY.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST.—Cont.					EASTERN DIVISION.				
Collie Saw Mills	1385	23	936	15	<i>—Continued.</i>				
Donny Brook ..	866	24	741	15	Mt. Morgan ..	155	10	56	4
Boyanup ..	1097	23	601	17	Laverton ..	283	11	63	..
Busselton ..	948	26	844	22	Murrin Murrin ..	214	14	81	4
Quindalup ..	899	20	622	12	Pendennie ..	203	7	71	3
Margaret River ..	1164	27	1084	20	Tampa ..	325	10	75	6
Lower Blackwood ..	1119	23	900	16	Niagara ..	325	8	99	7
Karridale ..	1155	28	1058	24	Edjudina ..	295	8	..	..
Cape Leeuwin ..	1061	29	748	23	Yerilla ..	351	10	71	6
The Warren ..	1346	24	849	19	Menzies ..	233	10	68	3
Lake Muir ..	..	..	458	14	Goongarrie ..	189	9	44	3
Mordalup ..	..	..	378	14	Kurawa ..	184	13	34	7
Riverside ..	718	21	458	17	Gladiator Mine ..	193	13	43	9
Balbarup ..	914	22	612	16	Kurnalpi ..	224	9	58	8
Mandalup ..	1046	21	662	14	Bulong ..	139	10	88	9
Bridgetown ..	1139	26	738	19	Kanowna ..	174	14	73	8
Greenbushes ..	1242	24	891	16	Kalgoorlie ..	206	14	46	7
Williams ..	769	20	417	10	Coolgardie ..	94	13	58	10
Arthur ..	604	23	309	10	Londonderry ..	144	17	56	10
Darkan ..	626	16	416	8	Widgiemooltha ..	65	6	57	8
Wagin ..	512	26	233	12	50-Mile Tank ..	91	10	67	7
Glencove ..	481	20	231	10	Norseman ..	109	7	99	8
Dyliabing ..	388	18	90	7	Bulla Bulling ..	64	6	54	..
Katanning ..	439	23	303	13	Woolgangie ..	112	12	61	8
Kojonup ..	535	20	294	10	Boorabbin ..	108	9	65	8
Broomehill ..	396	16	293	7	Karalee ..	104	7	61	5
Sunnyside ..	382	20	239	10	Yellowdine ..	99	5	7	2
Woodyarrup ..	363	19	204	11	Southern Cross ..	129	12	51	6
Cranbrook ..	432	22	233	12	Mount Jackson ..	221	14	53	5
Blackwattle ..	520	19	..	..	Bodallin ..	117	..	82	9
Mt. Barker ..	417	20	330	14	Burracoppin ..	245	17	20	2
St. Werburgh's ..	410	24	253	17	Kellerberrin ..	298	16	165	12
Forest Hill ..	598	27	493	20	Mangowine ..	277	18	..	..
Denmark ..	906	24	561	..	Waltoning ..	192	9	..	..
Albany ..	673	25	412	15					
Point King ..	738	25	426	15	EUCLA DIVISION:				
Breaksea ..	524	25	360	14	Coconarup ..	91	10	..	..
Cape Riche ..	215	12	..	..	Fanny's Cove ..	300	15	..	..
Pallinup ..	344	16	223	9	Park Farm ..	375	15	..	..
Bremer Bay ..	185	12	226	9	Esperance ..	415	19	372	..
Jarramongup ..	143	13	244	10	Gibson's Soak ..	220	7	..	..
					30-Mile Condenser ..	97	5	..	..
EASTERN DIVISION:					Swan Lagoon ..	94	16	..	..
Lake Way ..	251	10	..	..	Grass Patch ..	116	15	..	..
Lawlers ..	201	13	90	5	Lynburn ..	244	10	..	..
Diorite King ..	202	11	89	4	Israelite Bay ..	71	10	113	11
Sturt Meadows ..	163	12	92	4	Balladonia ..	124	8	67	7
Mt. Leonora ..	245	11	85	4	Eyre ..	240	..	161	..
Mt. Malcolm ..	174	9	83	3	Eucla ..	189	10	209	13

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF
JULY, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of												
FREMANTLE	5	9	1219	1173	46	..	..	1219	..	718	..	..	..	118	..	257	126	..	..	..	..
ALBANY	4	4	120	116	4	..	..	120	..	..	..	..	..	18	..	96	..	..	2	..	..
GERALDTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HARLEIN .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BONBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	9	13	1339	1289	50	..	..	1339	..	718	..	..	..	136	..	353	126	..	2	..	..
									Apricots.												
									Bananas.												
									Cherries.												
									Gooseberries.												
									Grapes.												
									Lemons.												
									Nectarines.												
									Oranges.												
									Passion Fruit.												
									Peaches.												
									Plums.												
									Rhubarb.												
									Strawberries.												
									Pomoloos.												
									Pines.												
									All other fruits.												

DEPARTMENT OF AGRICULTURE,
3rd August, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF JULY, 1900.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.														
									Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vine Cuttings.	All Other Trees
FREMANTLE ..	12	31	20789	31	20789	84	2999	3464	165	229	10	137	..	12	9289	1776	3373	552	2626
ALBANY ..	7	19	7471	19	7471	35	118	6	4584	72	29	44	59	11	16	210	76	47	2000	..	215
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	19	50	29260	50	29260	119	3117	2163	8048	237	258	54	190	..	23	3305	1986	3449	599	2000	3841

AGRICULTURAL SOCIETIES.

SOCIETY	SECRETARY.
Albany and King River Settlers' Association ..	R. H. Playne, King River
Albany and District Settlers' Association ..	J. Mowforth, Albany
Albany Agricultural and Horticultural Society	T. P. Haddley, Albany
Brunswick Farmers' Association ..	John Partridge, Brunswick
Boyanup Farmers' and Progress Association ..	W. Eccleston, Boyanup
Boulder City Dog and Poultry Society ..	J. E. Tambyln, Boulder City
Beverley Agricultural Society ..	G. E. H. House, Beverley
Capel Farmers' Association ..	C. F. McLean, Capel
Cookernup Farmers' Progress Association ..	John McEwin, Cookernup
Coogee Agricultural and Horticultural Society	W. H. Allen, Stockdale, Coogee Lake
Drakesbrook Agricultural Association ..	John Sutton, Drakesbrook
Deepdale Farmers' and Fruitgrowers' Assn. ..	J. W. Eakins, Toodyay
Donnybrook Progress Association ..	H. Mead, Donnybrook
Darling Range Vine and Fruitgrowers' Assn. ..	C. J. Wilkerson, Goosb'ry Hill
Esperance Agricultural, Horticultural and Floricultural Society ..	F. E. Daws, Esperance
Ferguson Farmers' Progress Association ..	Ephraim Gardiner, Ferguson
Greenough Farmers' Association ..	C. W. Sims, Walkaway
Goomalling Farmers' Club ..	R. M. Eaton Goomalling
Goldfields Dog, Poultry & Horti. Society ..	J. A. McNeill, Coolgardie
Geraldton Agri. and Horticultural Society ..	W. J. Cope, Geraldton
Greenhills Farmers' Club ..	James McManus, Irishtown
Greenough Farmers' Club ..	Arthur Clinch, Greenough
Great Southern Pastoral and Agricultural Districts Society ..	W. E. Keetley, Broomehill
Harvey Farmers' Club ..	Gervase Clifton, Harvey
Harvey Agricultural Alliance ..	Kenneth Gibsons, Harvey
Irwin Districts Agricultural Society ..	F. Waldeck, "Bonniefield," Dongarra
Jandakot Agricultural Society ..	H. Warthwyke, Beaconsfield
Jurakine Agricultural Society ..	W. Hayward, Jurakine
Jennapullen Agricultural Society ..	A. C. Morrell, Jennapullen
Kalgoorlie Dog and Poultry Society ..	W. H. Melton, Dugan-street, Kalgoorlie
Kelmscott and Armadale Agricultural Society	H. S. Davis, Kelmscott
Kojonup Agricultural Society ..	J. M. Flanagan, Kojonup
Mt. Barker & District Settlers' Association ..	John Morgan, Mt. Barker
Murray Farmers & Fruitgrowers' Co-operative Association ..	Ernest Fawcett, Pinjarrah
Murray Horticultural Society ..	Mrs. E. A. A. Fawcett, Pinjarrah
Moora Farmers' Progress Association ..	George Bishop, Moora
Narrogin-Cuballing Agricultural Alliance ..	W. H. Ingram, Narrogin
Newcastle Branch Bureau ..	W. A. Demasson, Newcastle
Nelson Branch Bureau ..	R. C. Williams, Bridgetown
Nelson Agricultural Society ..	R. C. Williams, Bridgetown
Newtown Progress Association ..	T. A. Thurkle, Woodlands, Vasse
Northam Agricultural Society ..	A. Scott, Northam
Northam Poultry and Dog Society ..	A. W. Byfield, Northam
Pingelly Agricultural Society ..	J. Bert Taylor, Pingelly
Quinalup Progress Association ..	W. E. Carter, Busselton
Royal Agricultural Society of W. A. ..	Theo. R. Lowe, Perth
Southern Districts Agricultural Society ..	A. R. Pries, Busselton
Toodyay Vine and Fruitgrowers' Association ..	W. A. Demasson, Newcastle
Toodyay Agricultural Society ..	E. G. Hasson, Newcastle

SOCIETY.	SECRETARY.
Thomson's Brook Progress Association ..	C. J. B. Fowler, Thomson's Brook
Upper Blackwood Vigilance Committee and Agricultural Society ..	A. S. Cailes, Upper Blackwood
Upper Preston Progress Association ..	W. Jackson, Preston
Victoria Plains Farmers' Association ..	J. Halligan, Summer Hill, Victoria Plains
Wonnerup Progress Association ..	P. S. Brockman, 'Reinscourt,' Busselton
Wellington Agricultural and Pastoral Society	W. S. Hales, Bunbury
West Australian Beekeepers' Association ..	J. B. Kline, Guildford
Waterloo Farmers', Vine & Fruit Growers' Assn.	F. C. Woods, Waterloo
West Australian Poultry and Dog Society ..	W. C. Byass, Swan Chambers, Barrack-street
Wongamine Farmers' Club ..	G. W. B. Smith, Wongamine
West Coolup Branch Bureau ..	A. Anderson, West Coolup
Wandering Districts Agricultural Society ..	S. R. Watts, Papanying Pool, <i>via</i> Pingelly
Walliabap Progress and Horticultural Assn.	F. G. Nicolay, c/o John & Cleary, High-street, Fremantle
Waigerup Agricultural Hall Association ..	G. Smith, Waigerup
Wagin-Arthur Agricultural Alliance ..	O. R. Taylor, Wagin
Williams Agricultural Society ..	Chas. H. Maclean, Williams.

Secretaries of Societies will please be good enough to notify at once any alterations or corrections

Secretaries of Societies are requested to notify the Department of Agriculture of the dates on which their annual Shows are to be held, as soon as they are fixed.

NOTICE TO CONTRIBUTORS.—The Secretary, Department of Agriculture, will be pleased to receive contributions for the JOURNAL on agronomic subjects generally. These should be brief and to the point, and written on one side of the paper only. Reports on the state of crops and stock and produce movements in the various localities will be much appreciated.

NOTICE.—The JOURNAL of the Department of Agriculture will be issued monthly, as nearly as possible on the 15th of each month. The annual subscription has been fixed at 2s. 6d. (single copies 3d. each). Members of the Western Australian Parliament, Agricultural Advisory Board, heads of Departments, kindred departments and learned societies in other parts of the world, public libraries, the presidents and secretaries of all societies registered on the books of the Department of Agriculture, Wardens, Agricultural Halls, Mechanics' and kindred Institutes, advertisers, the press, and those who send agronomic publications in exchange are entitled to receive the JOURNAL free. All other persons who may wish to receive the JOURNAL must forward 2s. 6d. (postage stamps not taken) to the Accountant, Department of Agriculture, Perth, and this will entitle them to receive all the publications issued by the Department during the ensuing twelve months



JOURNAL

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OF

WESTERN AUSTRALIA.

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SEPTEMBER, 1900.

Perth:

PARAGON PRINTING WORKS, 105 MURRAY STREET

1900.

NOTES.

DATE OF SHOWS.—Secretaries of Agricultural Societies are requested to notify the Department of Agriculture of the dates on which their annual shows are to be held, as soon as they are fixed.

PRIZE FOR SEA OF AZOF BARLEY.—As will be seen on our notice page the Hon. Minister for Lands has decided to offer a prize of one guinea for the best sample bag of Sea of Azof barley returned to the Department, and grown from the seed recently distributed by the Department.

REMITTING DUTY ON STUD POULTRY.—With reference to the resolution brought forward at the recent Poultry Keepers' Conference, suggesting that all duties should be taken off birds imported for stud purposes, the matter has been referred to the Hon. the Colonial Treasurer, who now replies to the effect that Government have no power to remit the duty on poultry.

CONGRATULATIONS.—Mr. W. McKenna, Wagin Lake, writes as follows:—Not long ago, one of your JOURNALS was left at our house, and looking through it I find a great deal of very useful information, and I shall certainly subscribe to it, as I consider it is the most useful all round journal published. I see in the JOURNAL the names and returns of the wheat and potatoes grown at Drakesbrook, and I shall certainly try some of the wheat next season.

NATIONAL SHOW OF PRODUCE.—The Hon. the Minister for Lands has approved of a grand National Show of Produce being held in Perth in connection with the Producers' Conference next April, it is proposed to hold the show during the week the conference is sitting, and prizes are to be offered for the best collection of produce exhibited by groups of societies, prizes are also to be offered for the best exhibit of manufactured goods from West Australian produce. It is hoped that all societies will make up a collection of produce grown in their districts. Full particulars are published in this issue.

WESTERN AUSTRALIAN WHEAT.—The Minister for Lands has received a communication from the Agent-General in London, Sir E. H. Wittenoom, in reference to a consignment of Western Australian grain shipped to London last season by the Department of Agriculture. In this letter Sir E. H. Wittenoom remarked that he had received from Messrs. Berry, Barclay and Co. a report on the wheat, barley, and oats comprising the consignment. This firm mentioned that one of the purchasers of the wheat had written of it in the

following terms :—"I am much pleased with the wheat. I think it is the best delivery of Australian I have ever had, being so free from anything objectionable, as well as of fine quality." Sir E. H. Witte-noon also informed the Minister that a sample of the wheat had been forwarded to the Paris Exhibition.

TASMANIAN FRUIT PESTS.—Writing to the Secretary for Agriculture on the precautions taken in Tasmania by the Council of Agriculture to guard against the introduction of orchard pests, Mr. A. Despeissis, Viticultural and Horticultural Expert, states:—"A few notes from Mr. Lea, and also a copy of the annual report for 1899 of the Council of Agriculture, Tasmania, convey some interesting information regarding the feeling which prevails in Tasmania on the matter of orchard pests, and also the steps that have been taken in order to deal with them. The information contained in the Government Entomologist's report on the subject of the introduction into that colony of the Mediterranean fruit fly and the San Jose scale, from New South Wales, shew the wisdom of prohibiting the importation into Western Australia of oranges from that source. The mention of the outbreak at Launceston of the fruit fly, and its reported suppression is interesting, and I am pleased to hear that Mr. Lea has been successful in stamping out the pest by means of kerosene and water. I have entered into communication with him on this matter, with a view of putting his advice to the test this coming season. If I remember rightly, Mr. Lea's idea is to spray the trees in the evening, whilst the flies are resting on the affected trees. It would seem that in the case of the fruit fly, even a careful inspection does not always reveal the presence of maggots, and that the only absolute safeguard is prohibition. As regards orchard pests not known in Tasmania, the feeling is strongly in favour of the maintenance of the present embargo policy, a policy which in Western Australia has hitherto been as successful as was anticipated."

NEW CROPS.—In an interview, while on a recent visit to Geraldton, Mr. Despeissis, the Viticultural and Horticultural Expert to the Department of Agriculture, said:—"Among the new crops which, in my estimation, would prove most profitable if grown in this district, I wish to mention two more particularly. I should much like to see the systematic cultivation of the pineapple undertaken here. I do not think it will thrive anywhere and everywhere, but it will most assuredly do well in favoured spots such as Kojerina or Tibradden, and many other places in the district. We now get our pineapples from far distant colonies, and these, you know, are not of the choicest sort. Large quantities are imported. It is a fruit which keeps and carries well. There is no reason why we should not grow pineapples ourselves. The plant is low, and not unlike a miniature aloe. It possesses tough and fibrous leaves, and therefore should not be shaken by the strong winds as other plants would be. It bears early, and when well looked after several tons of most delicious fruit can be obtained from an acre. To those wishing to learn more on this subject I shall be glad to

furnish more detailed information. Another plant should some day receive a considerable amount of attention in this district. I refer to the aloe, and particularly to the varieties botanically known as *Agave Mexicana* and *Pourcroya Gigantea*. They are much grown, amongst other places, in Mauritius, in the most arid parts, where the sugar-cane cannot be grown, and the fibre it yields is known as "Sisal hemp," and also "Mauritius hemp." It finds an unlimited market at a remunerative price. It would grow here, all over these sand plains and the limestone in the vicinity of the coast.

THE TWO-BUSHEL BAG.—In our July issue an article was published on the adoption of the two-bushel wheat pocket, which is now generally displacing the unweildy four-bushel sack. Full particulars were given in this issue; this has caused several enquiries to be made as to where they can be obtained, prices, etc. The Secretary, Department of Agriculture, has written to the Farmers' and Settlers' Co-operative Association in Sydney for quotations for two-bushel bags, and they have replied as follows: "Re two-bushel bags. There are two samples. The 'Frisco' wheat pocket, which is largely used in 'Frisco, is 36 by 22, of light material, which we can quote at 2s. 4d., Fremantle, c.i.f. The heavier pocket is 2s. 6d.—1,000 in a bale. The farmers are advised that the cost of bags is less, the handling much less laborious, more convenient for shipping and handling, and if used for conveying wheat to elevators, are only tied at the mouth and used over and over again by the farmer." The Department of Agriculture is endeavouring to arrange for some samples of these bags which, when obtained, will be exhibited in the Museum of the Department, and at various country shows.

OSIER OR WILLOW CULTURE.—The cultivation of Osiers, *i.e.*, species or varieties of Willow which are specially adapted for basket-making, should prove successful, if not a profitable industry. Considering the importance of this industry in Europe, more especially in France and Germany, where it gives employment to many thousands of persons, it is not surprising to hear of fresh interest being manifested in its development in America and Australia. The U.S. Department of Agriculture, Division of Forestry, has lately issued a pamphlet on the subject, dealing with the cultivation and use of Osiers, together with notes on their geographical distribution and characteristics. Willow cultivation involves but little care or expense. A marshy soil by the side of streams or rivers, or round lagoons, such as is unfit for other agricultural pursuits, is the most suitable. No manuring is required, and a renewal of plants is seldom necessary. Propagation is usually effected by cuttings, which should be about 15 inches long and planted in lines 2 feet apart. A crop may be expected in the second or third year. Planted on sloping swampy land, Willows should also serve the purpose of binding the soil and preventing it being washed away in heavy rains. Among the best Willows for basket-making are: *Salix amygdalina*, *S. viminalis*, *S. purpurea*, *S. lucida*, and *S. caprea*.

SHEEP.

BY PERCY G. WICKEN.

Sheep belong to the order *Ruminantia*, and are of the genus *Ovis aries*. They were the first animals domesticated by man, and supply the two principal wants of the human race, food and clothing, they can be found in every country, not entirely savage, from the Arctic to the Torrid Zone. From the earliest periods of human history we have records of sheep being kept by men for domestic purposes.

In 1890 the latest complete returns available give the total number of sheep in the world at 609,447,000, divided as follows :—

Europe	...	...	214,499,000
Asia	...	...	71,669,000
Africa	...	...	60,820,000
America	...	...	143,581,000
Australasia	...	...	118,878,000

The following table is interesting, as it shows the progress made in sheep breeding in the Australian colonies.

In 1788 there were in the Australian colonies				29 sheep
1798	"	"	"	3,902
1808	"	"	"	10,157
1818	"	"	"	170,420
1828	"	"	"	1,090,089
1838	"	"	"	6,202,430
1848	"	"	"	19,382,453
1858	"	"	"	17,091,798
1868	"	"	"	40,915,817
1878	"	"	"	48,063,931
1888	"	"	"	79,679,235
1898	"	"	"	100,470,162

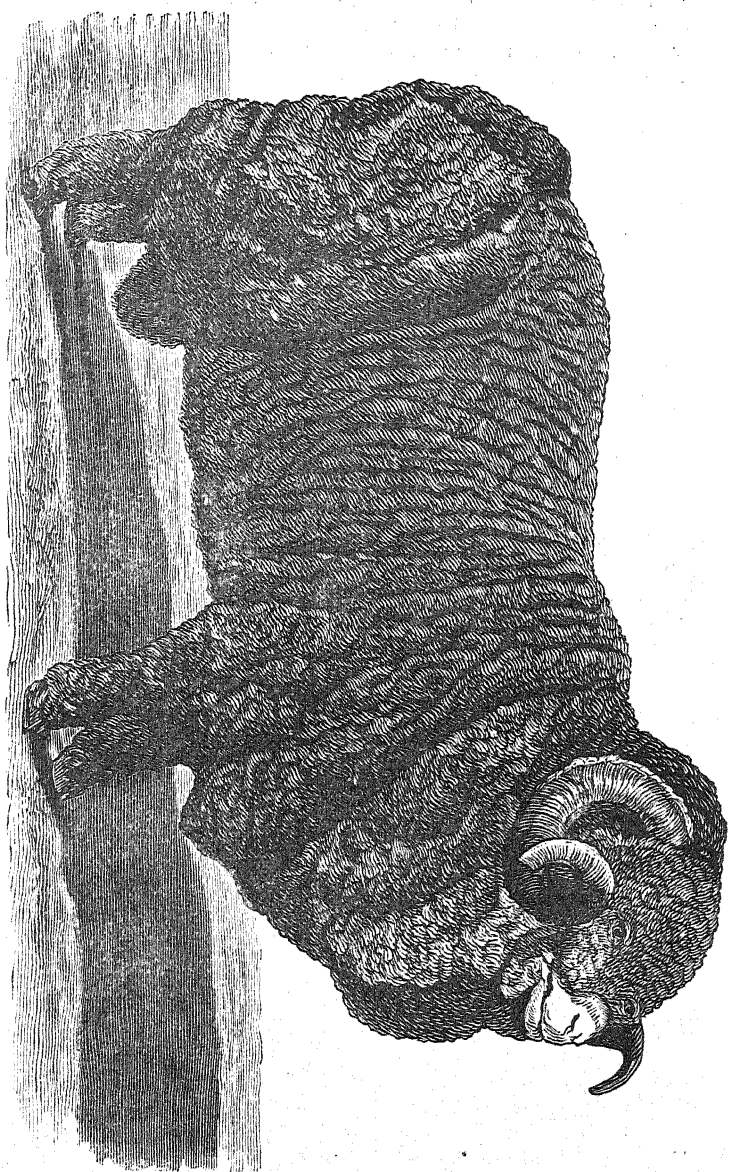
The highest number, nearly 120 million, was reached about 1892-3 since which time, owing to the series of droughts and the great number exported, there has been a decline in the total numbers.

Ships are now leaving the Australian colonies almost every day carrying a freezing chamber holding up to 100,000 carcasses of mutton, one shipload such as this is sufficient to depopulate a good size sheep station.

Looking at our statistics of Western Australia, we find that during the past ten years we have made very little progress indeed, and that the numbers through that period have remained very steady, the fluctuations from year to year being very small. The returns are as follows :—

1889.	Total number of sheep in Western Australia,	2,366,681
1898.	"	2,251,548

A small decrease has been made during this period, whereas, with the large area of land available, a large increase should have been made. Sheep have risen considerably in price during the last two years, and the price now realized for mutton, to say nothing of the wool, should be sufficient to induce our farmers to go in more extensively for sheep breeding. There is ample room in this colony



Merino Ram—Senator, by President.
Bred by Mr. W. H. Gibson, Tasmania.

for both the large sheep breeder or squatter, and for the farmer, the squatter may take up large areas of country, and breed great numbers of sheep, but it is to the farmer, who will combine sheep breeding with farming, to whom we must look for supplying the market with fat sheep and lambs, and who, by growing crops and feeding sheep, are able to have fat sheep to market all the year round. Sheep breeding has several advantages over cattle breeding, as the returns are quicker, they mature earlier, in the event of death the loss is not so heavy, and they bring in an annual return for their wool, which is of considerable help to the man who is trying to get along on a small capital.

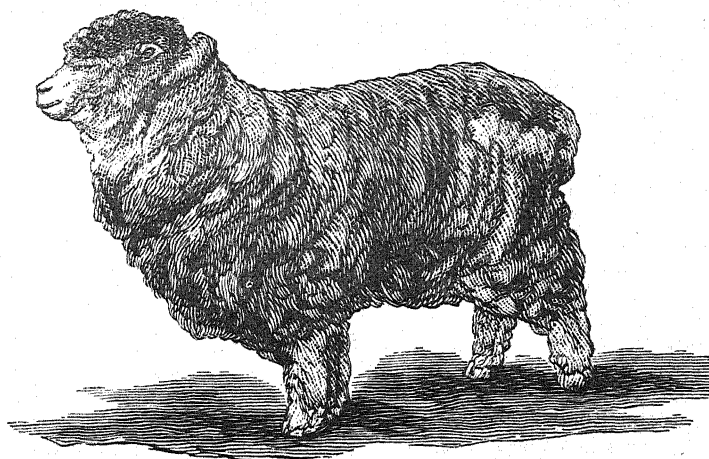
THE MERINO SHEEP.

It is not known when the word Merino was first applied to the sheep of Spain. The term Merino, is an adjective derived from Merinos—a superintendent of sheep walks. The first Merino sheep were supposed to come from Asia to Spain as far back as 1100 B.C. Spain was then celebrated for the quality of its sheep and wool. After the Peninsular war the Spanish sheep were so neglected as to be almost worthless, and after an existence of twenty-five centuries they are no longer known in their own country, but before the war large flocks were exported to other countries. Spain has since been anxious to improve the breed, and has imported sheep but with only partial success. In 1779 3,000 Merinos were procured from Spain by the French Government, and 60 stud farms were established for producing stud sheep equal to the Spanish. Rambouillet was the most successful of these, and Australian breeders have drawn largely from this farm for stud purposes. Some Merino sheep were introduced into England as early as the 15th century, but during 1787 George III. collected a few on the shores of Portugal and smuggled them on board at Lisbon, they were landed at Portsmouth and transferred to Kew, but George III. was not satisfied with them, and had them destroyed. He then made direct application to the King of Spain for some of his best sheep; the application was granted, the sheep were put on rich, luxuriant soil, and soon exhibited foot-rot, but when removed to higher and dryer ground, they were found to be as healthy as any other British breed. Some of the British ewes were crossed with the Merino rams with satisfactory results. The Merino sheep found some very good advocates, among them were Lord Sunnerville and Sir Joseph Banks, but it had strong prejudices to encounter, they were small in carcass, and the wool unsuitable for the then manufacturers. George III. bred from these sheep for 13 years before he sold any of his flock, in 1804 he had a sale, and the highest price for a ram was 42 guineas, and 11 guineas for ewes; in the following year he sold 17 rams and 21 ewes, which averaged 30 guineas each; in 1810 he sold 33 rams averaging 58 guineas, and one ram sold at 173 guineas.

In 1811 a Merino society was established, and Sir Joseph Banks was its first president, 45 vice-presidents were elected, and local societies established all over the kingdom, prizes were offered for sheep, but the Merinos lost ground, the society went down, and now very few Merinos remain in the British Isles.



CHAMPION MERINO RAM—President II.
Bred by Mr. J. Gibson, Tasmania.



"DAISY," Champion Ewe of the Sydney Show.
Bred by Executors of the late David McCaughey.

The first Merinos were imported into America from Spain in 1793, but were killed. At a sale in Spain in 1809, the American Consul purchased 1,700 pure Merino sheep and sent them to America, next year he sent 3,850, besides 2,500 sent by private persons. Between 1809 and 1811, 106 vessels, carrying 15,767 sheep, left Spain for America.

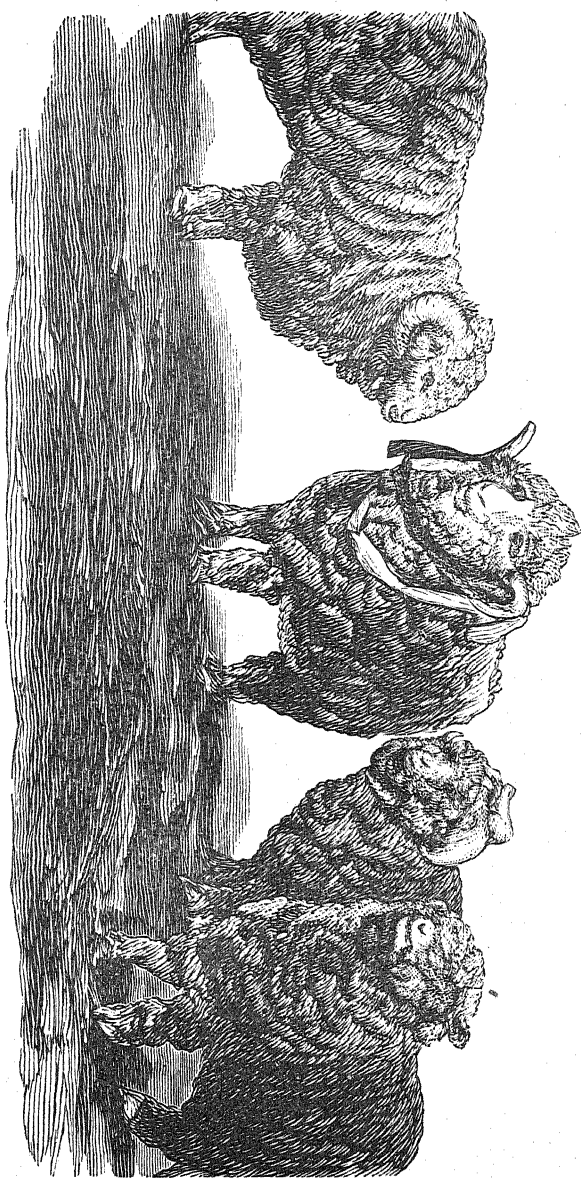
The first Merinos introduced into Australia were brought from the Cape of Good Hope. They were imported from Spain by Colonel Gordon, who died shortly afterwards, and the sheep were sold, they were bought by Captain Waterhouse of the *Reliance*, from his widow, at £4 per head, and brought to Sydney; there were 13 head landed. On arrival Captain McArthur offered 15 guineas each for them, but was refused, and they were sold to various owners, Captains Kent and McArthur, Messrs Marsden, Laycock & Cox, being among the purchasers.

Hon. G. H. Cox, of Mudgee, New South Wales, has some of the pure bred descendents of these sheep yet.

Captain McArthur was most successful from the first, and found that the wool did better than it did in Spain.

The Van Diemens Land Co., of Tasmania, were large importers of sheep from Germany and George the Third's flock, it was founded in 1825, and between that and 1830 they expended £30,000 in the purchase of sheep. The Australian colonies are mainly indebted to this Company for the great success that has been obtained from the breeding of Merino sheep in Australia. Most of the best sheep in the early days brought to Victoria, South Australia, and New South Wales, were obtained from this company, they did a vast amount of good by selling young rams every year. Tasmanian Merinos are celebrated for combining great length of staple with fine, bright, lustrous character of fleece, the wool is very dense, and is carried right round and underneath.

In the year 1829, Mr. T. Henty, of Sussex, England, chartered the ship *Caroline*, and sent by her to Western Australia, in charge of his three sons, a large number of Merino sheep of his own breeding, forty people from his own parish, and several thoroughbred horses selected from the Earl of Egremont's stud. The whole shipment arrived safely at Swan river and, for a time, settled there. Finding that the sheep did not do as well as anticipated, the brothers Henty re-shipped their stock, and took them to Tasmania in the *Cornwallis*, in 1831. These are probably the first sheep that were imported into Western Australia. For the following particulars, with regard to the early importation of sheep into Western Australia, we are indebted to Mr. W. Padbury, one of our earliest settlers. In February, 1830, a Mr. Hall brought 25 Merino sheep to Fremantle in the barque *Protector*, these sheep were landed and turned adrift, but they were never heard of again, and there are no records as to what become of them, but it is most probable that they were killed through eating some of the poison plants which grow about the districts. Dr. Foley brought out 30 Merino sheep, and a shepherd, by the same vessel;



MERINO RAM—Eclipse, and Progeny.
Bred by Hon. S. McCaughey.

these were landed at Fremantle, and were well looked after, and did very well; they were afterwards sold to Mr. G. Fletcher Moore.

Mr. A. Trimmer imported 300 Merino ewes during the year 1833-34, and they were the first sheep ever sent to the Eastern districts of this colony. They were driven overland from Guildford to York, and grazed all the way, and although the country was thick with poison bush none of the sheep were lost on the journey, these sheep formed the nucleus of flocks now in the York district. Mr. W. Padbury was one of the men engaged in taking this flock of sheep to York. Most of the mutton in these days, that was used for food, came from Tasmania, and was of very poor quality, it was sold at Fremantle at 1/6 per pound.

A few years later Mr. L. Lukin imported 300 young Merino ewes, and these were sent to the Newcastle and Toodyay districts.

Mr. T. Mellish also imported some Southdown sheep, but these did not do so well.

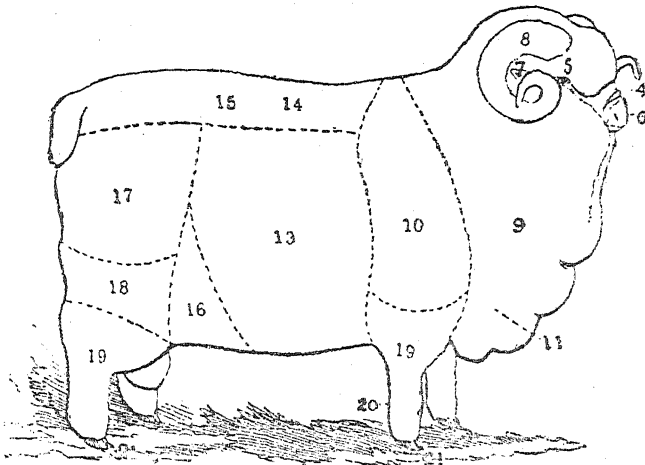
In 1863 Messrs. Padbury, Wellard and Withnell chartered the barque "Tein Tsein" for two trips from Fremantle to Nicol Bay, and this was the first settlement in the N.W. district, they took with them a large number of Merino sheep, these were the first sheep introduced into the N.W. district of the colony.

During 1880 Messrs. Hope and Crawford of Moorrarrie, on the Murchison, imported some of the best Merino rams obtainable in South Australia at the time.

Messrs. R. H. Rose, junr., Roelands, Bunbury, J. M. Craig, Beverley, Mackenzie Grant, Neumerrucarra, Edgar Wedge & Co., Gingin, Dalgety & Co., J. H. Monger, York, W. T. Loton, Perth, have been among the first importers of Merino sheep into this colony.

A large number of valuable sheep still continue to be imported, most of which are sent to the N.W. districts. The following notice taken from the *Australasian* of June 16th shows that some good rams are still being introduced into the colony, which cannot fail to have a beneficial influence on our present studs:—

"MERINOS FOR WEST AUSTRALIA.—Though West Australia has not hitherto been noted for the high quality of the Merino sheep raised on its pastures, there are a few sheep farmers in that colony who are determined to bring up the character of the flocks raised there, and to this end they have made frequent importations of high-class sires from some of the best flocks in the Eastern colonies. Some shipments of picked sheep were made from the noted Murray studs in South Australia, and draughts from the Wanganella stud have followed. Last year some remarkably fine rams drawn from the Zara stud were shipped, and among them were two special rams for Mr. A. C. Gillem, of Chirita Station, near Roebourne. One of these rams, a two-tooth, was regarded by many pastoralists as the finest animal of the breed that has been shipped to the West. On the 2nd inst. two lots of rams of 100 each, and both from the Zara flock, were shipped for West Australia by the steamer Anglian. One lot was for Messrs. M'Rae and Harper, of Globe Hill Station, Ashburton, who have already made several importations. The other lot was



POINTS OF MERINO RAM.

4. **COUNTENANCE.**—The forehead should be broad and the countenance healthful.
5. **THE EYES** should be bright and placid, and free from spots.
6. **THE MUZZLE.**—The muzzle should be clean, the nostril expanded and the nose white, wrinkly and covered with short furry, soft, velvety hair.
7. **THE EARS** should be white, soft, thick, wide apart, and partly covered with wool.
8. **THE HORNS** should not be too close to the head and neck, nor standing out too widely, and free from black or dark streaks.
9. **THE NECK** should be short on the top, deep when viewed from the side and long below, strongly set to the head and shoulders, towards which it should be becoming deeper.
10. **THE SHOULDERS** should be broad and missive as to depth and breadth, very little, if any, above the level of the back, and well placed.
11. **THE CHEST** should be wide and deep.
12. **THE SKIN** should be thick, soft and pink.
13. **THE BARRREL** should be round and lengthy.
14. **THE BACK** should be short, level, strong and straight.
15. **THE LOIN** should be broad and strong.
16. **THE FLANK** should be deep and straight.
17. **THE QUARTERS** should be long and well filled up.
18. **THE THIGHS** should be long and broad.
19. **THE LEGS.**—The fore legs should be short, straight and well apart, and the hind legs should be set so as to give the hind parts a perpendicular appearance, while the bone should be heavy but of fine texture.
20. **THE MUSCLE** should be fine and firm.
21. **THE HOOFs** should be clear in color and well shaped.

for Mr. C. M. Davies, of Batmaringarra Station, Kimberley. Mr. Davies is, I am told, the father of the famous Major Karri Davies, who has earned such well-deserved renown in the South African war. A further lot of 75 two-tooth rams from the Zara flock were shipped last week for West Australia in the steamer Kalgoorlie. They are for Mr. A. C. Gillam, and with them is a four-tooth ram given by Mr. Officer to replace one of the special rams that died. The ram that died is, I am glad to say, not the one that excited so much admiration when seen in Melbourne. The last lot of rams were on view at Messrs. Younghusband and Co.'s wool warehouse for a few days last week, and many who are interested in fine-wool sheep husbandry took advantage of the opportunity to inspect them. They were a most attractive lot of sheep, fully up to the standard one expects from the Zara flock, and that is saying a great deal. These sheep will be found well adapted to the environment in West Australia. Their great point is the way the wool is put on the back. It is so dense that there is no danger of injury from sun or dust. They are admirably covered, with splendid necks and broad thighs. Their evenness of type and high-bred appearance tell plainly of many years of careful and skilful breeding. The Zara sheep are of Tasmanian origin, and for many years after the formation of the stud none but high-class sires from the leading Tasmanian studs were used. The type has been fixed by long inheritance and skilful selection, and this gives them a prepotency that renders them of special value to the sheepbreeder in improving his flock. The sheep sent to West Australia are of sturdy frame, on short legs, and though in rather low condition they show plenty of size. The last year was a very bad one at Zara, and I was told that the young rams had scarcely had any green feed from the time they were born until about two months ago."

The accompanying illustrations show the types of sheep that have taken the prizes at this year's shows in the Eastern colonies.

(To be continued).

POULTRY ON THE FARM.

By A. CRAWFORD.

If an incubator is not used and it is desired to hatch very early chickens, there is generally a difficulty in getting broody hens. To overcome this difficulty a turkey may be used, and for the purpose an old one is the best. Make up the nest and put half a dozen or more artificial eggs in it, have a box that will just cover the nest and turkey without much room to spare. Take the turkey at night and give her two tea-spoonfuls of half water and half whiskey or brandy or three tea-spoonfuls of port wine, sit her down on the eggs and place the box over her, the following night repeat the dose, and next day examine her in daylight, and if she is sitting down comfortably

on the nest the artificial eggs may be removed after dark and the others put under her. If she is not sitting on the nest repeat the dose once or twice more and feed on soft food. If after dosing for four nights she still refuses to sit she had better be let go and another one tried. My experience is that two out of every three tried will sit. The turkey should be kept covered up all the time she is sitting, but each day she should be lifted off and allowed a run for about 15 minutes. It is well to have a little wire netting round where the nest is, for if she wanders away, frequently she will not return to the nest, and there may be trouble catching her. Once she has commenced to sit feed on grain and give no soft food. When the chicks come out they can be taken away from the turkey immediately and a fresh sitting of eggs put under her. Three sittings in succession of from 15 to 18 eggs each can thus be obtained from one turkey, but to keep the turkey in health it is absolutely necessary that she should have exercise daily. It will frequently be found that after the turkey has finished sitting she will be several pounds heavier than when she started.

It is not advisable to allow a turkey to rear chickens or young turkeys unless their run is limited. Turkeys are great wanderers and never seem to mind the chicks, as long as one or two keep following her she will keep going on regardless of the calls of those she has left behind.

Amongst the fowls Brahmas and Cochins are about the best sitters, and will sit frequently during the season, and if the hens are old they will often sit if put on some eggs and shut up for a few days. It is all right to use them if they are only required for hatching purposes, but if the hen is to rear the chicks these birds are very clumsy and awkward, the long feathers on their legs knocking over the young ones and often crushing them. Game and Malays make good sitters and look well after the young, but they should be kept apart from other birds as they fight on little or no provocation, and some of the little ones that have not sense to keep out of the way often come to grief. They are also very often wicked with other chickens, and I have frequently seen them kill other chickens with a single peck. Langsbans make excellent mothers, and will allow her own and other chickens to be mixed up and take charge of the lot, even if they be of various sizes and ages. Plymouth rocks are frequently rough, especially in scratching, and will often send the little ones flying in all directions in her eagerness to turn up something out of the ground, the results often are broken limbs and sometimes killed outright.

Orpingtons, Wyandottes and Dorkings or crosses of these make good and careful mothers. When a hen is sitting she should be fed and allowed off the nest every day, not only for her own sake, but also because the eggs need airing. If the hen is not inclined to come off she should be gently lifted off immediately after the food is thrown down, and after a day or two she will generally come off herself; feed on grain all the time of sitting, wheat for preference.

If the weather is at all dry the nest should be damped a few days before the chickens are due to come out. Pour a jug of warm water (say a pint) into the nest slowly while the hen is off feeding, and that will supply sufficient moisture to keep the membrane inside the shell soft and easily torn. If not kept moist the membrane becomes tough and hard and the chicken cannot tear it, and thus dies in the shell. Duck eggs need more attention in this way than fowl eggs, and the nest should be kept fairly damp. Eggs that are hatched early in the season will scarcely require any added moisture.

If the eggs do not hatch out to time do not destroy them at once, let them be for at least two days longer, they may come out even then. Sometimes they will come out a day earlier than expected. The usual time for hen eggs is 21 days, for ducks 28 days (Muscovy ducks take 35 days), turkeys 26 to 29 days, guinea fowls 26 days, geese 30 days.

After the hen has been sitting for seven days the eggs should be examined by candle light and all unfertile eggs removed. To examine them cut a pear shaped hole in a piece of cardboard or dark paper a little smaller than the egg and take each egg from the nest and hold it against the hole in the cardboard or paper between the eye and the caudle. If it is fertile there will be a dark shadow shading off lighter to the sides. If unfertile it will appear clear like a fresh egg, only sometimes the air cavity at the top will be much sharper defined.

It is much better to test all the eggs thus, as there is no fear then of rotten eggs getting broken in the nest and fouling the hen. The eggs thus rejected can be kept and boiled hard for feeding the chickens on in the first few days after hatching.

If anyone is at all doubtful, let them try a fresh egg against the light and then one from the nest, if it is fertile the difference will be seen at once and there will be no reason for a mistake being made. If any of the eggs in the nest get cracked a little gum paper may be put round the crack.

When the chickens begin to come out, if the hen is to rear them, leave them alone for at least 12 hours. For the first 12 hours of their existence chickens require no food and are better without it. Even 24 hours fasting will not hurt them, and it is better to let them be that time rather than disturb the hen and perhaps have some of the chickens killed or injured. The food of young chicks should consist for the first few days of hard boiled eggs and bread crumbs, give a little at a time and often. If there is no natural grit where the fowls are give some. A good grit is made by grinding up all the old crockery and china in an Enterprise mill. It can be crushed up very fine for the chickens. After the hen comes off first with the chickens she should have a good feed of soft food, as much as she can eat. Otherwise there will not be much of the bread crumbs and egg go to the chicks. After the first few days the chickens can be

put on a less expensive diet. If one has an Enterprise mill a good food is made by grinding up two parts oats, two parts barley, one part maize and one part wheat, grind fine and damp either with milk or scalding water. Do not have it sticky or pasty, a little coarse bone meal added will be an improvement. The Enterprise mill will grind the bones if they are broken with an axe and well dried. Sliced green bone will make them come on wonderfully well, but as this requires a mill for the purpose a little fine shredded meat will answer. Some barley and wheat coarsely ground will do for the night ration. They will do well on these rations until ready to be put on the ordinary fowl diet. Green feed should at all times be available for chickens and their water should be fresh daily, or if fouled oftener. The water should be kept in the shade and as cool as possible. If there is any disease about or fear of it, put 1 oz. of sulphate of iron into a gallon of water and give them that to drink. It will act as a good preventive.

EXTRACT FROM REPORT ON BLACK SPOT OR APPLE SCAB.

[*Fusicladium dentriticum.*]

BY ARTHUR M. LEA, F.E.S.

(Government Entomologist, Tasmania).

At a meeting of the Council of Agriculture, Hobart, it was determined that experiments should be carried out against the disease known in Tasmania as "black spot;" and as this disease is more destructive in the Huon districts than elsewhere in Tasmania, it was determined to carry them out at Franklin.

The Council instructed me to obtain the necessary materials, and to do what I could in the matter.

There are very large numbers of different fungi that attack different plants, and the appearance of which to the naked eye is very similar to that of black spot; but, so far as is known, the black spot of the pear is confined to the pear, whilst that of the apple is confined to the apple, except that it is sometimes seen infesting the pear.

Reproduction is by spores, which are too minute to be seen individually, and which are carried about by the wind. Soon after

lodging on an apple in suitable weather roots (known as mycelial threads) are thrown out, and penetrate below the skin; here they are nourished, and the skin of the apple above them takes on a greenish or yellowish appearance; it soon splits, and a small sooty spot appears. This spot is composed of millions of spores, and in its early stages can be scraped off. It spreads slowly, splitting up the skin of the apple (which looks white and dead) around it as it grows.

Damp moist weather is most favorable to the growth of black spot, and, indeed, of most fungi. Accordingly, in Tasmania we find that those districts that have the greatest number of rainy days in the spring and summer are most affected by it.

Apples are affected by the spot in different ways according to their state of growth and according to the variety. Soon after, or even before the petals have fallen, spots may frequently be seen on the flower stalks, and these spots will almost invariably cause the apple to fall before it becomes the size of a pea; so many are occasionally destroyed that sometimes very little fruit is left on a tree. Afterwards, from the time fruit is the size of a marble, the spot will seldom cause the fruit to fall; but wherever it appears arrest of development takes place, the unaffected side growing normally, whilst the spotted side is shrunken. With certain varieties, more particularly the Scarlet and Adam's Pearmain, the fruit becomes badly cracked and worthless; these cracks are more noticeable soon after a shower, the sudden access of moisture to the tree causing a rapid swelling to take place, and the skin at the black spots being hard and lifeless cannot expand, and in consequence splits.

Pears, when attacked by the spot early in the season, will sometimes lose their entire crop, the ground beneath them being littered with fruit, from the size of peas to large marbles. Some varieties become badly distorted, and utterly worthless. As a rule, on the pear large patches are covered, either on the side just below the middle or near the crown. On the apple the disease is invariably present in small, round spots, which, however, may become joined together as they grow; they are not generally distributed, but usually in small clusters on the side of the apple facing the prevailing wind. Sometimes hundreds of spots may be counted on a single apple. On the leaf of the apple larger and less rounded spots appear, and these may sometimes split; with the leaf of the pear splits frequently appear on each side of the mid-rib, and the leaf is often distorted.

Of the largely-grown varieties of apples the Adam's New York, Scarlet, and Crow's Egg seem to be worst affected.

The Sturmer, if attacked early in the season is generally destroyed, but if attacked when a fair size seems capable of throwing off the disease, although not escaping a slight distortion. This is also the case with a number of hard-skinned varieties.

Black spot appears to have been exceptionally bad during the 1898-99 season, and especially bad at Geeveston. In two columns I

give in bushels the ordinary crops obtained by a number of orchardists of that district, and the crops actually obtained that season :—

	Ordinary Season.	Season. 1898-99.
S. Geeves, jun.	500	200
J. Evans	3,000	800
J. Thompson	400	100
G. Thompson	1,000	450
T. Exeter	500	70
S. Harwood	200	20
J. Studley	2,000	800
F. B. Hill	1,000	100
J. Halloran	1,000	130
G. D. Bennett	3,000	600
P. Riley	600	100
W. Hankin	600	300
J. Riley	1,000	100
W. Davis	700	10
J. Harwood	1,000	500
P. Halloran	3,000	1,500
Totals	19,500	5,780

These figures are for boxed fruit only.

Not being well acquainted with the names of the different varieties of apples and pears, I can take no responsibility for the names here given, but they are such as are in general use amongst the orchardists of the districts about the Huon. My predecessor has commented on the unreliability of the names given to the different varieties of apples.* He states that the

New York Pippin is really the Cleopatra.

Adam's Pearmain is really the King of the Pippins.

Scarlet Pearmain is really the Scarlet Nonpareil.

Dutch Mignonne is really the Adams Pearmain.

If, therefore, the names of such well-known and largely-grown varieties are not to be depended upon, probably few of the names given are reliable. As, however, the varieties are well known by the names hereunder given, probably no misconception can occur as to the actual variety meant; and I have therefore considered it best to publish the names as they are known in the Huon districts.

APPLES LEAST LIABLE TO BLACK SPOT.

Hollow Crown, Stone Pippin, Dutch Mignonne, Coleman's or Cornish Aromatic, Boston Russet, Ribston, Golden Russet, Alfriston, Claygate Pearmain, London or Five Crown Pippin, Blenheim Orange, Northern Spy.

APPLES FAIRLY FREE FROM BLACK SPOT.

Royal Pearmain, Bradocks' Nonpareil, Jonathan, Peuters Plate.

*Insect and Fungus Pests of the Farm, Field, and Garden, by Edward H. Thompson, part 2, page 64.

APPLES MOST RELIABLE TO BLACK SPOT.

New York, Scarlet Pearmain, Adams Pearmain, Newtown Pippin, Shepherds Perfection, Crofton Pearmain, Hoover, Duke of Clarence, Crow's Egg, Pearson's Plate, Prince Alfred, Princess (or Cato's Seedling), French Crab.

PEARS LEAST LIABLE TO BLACK SPOT.

Giblin's Seedling, Josephine de Maline's Winter Cole, Beurré Chairgeau, Golden Bergamot, Beurré au Capmont.

PEARS MOST LIABLE TO BLACK SPOT.

Napoleon, Marie Louise, Louise Bonne of Jersey, Beurré Bosc, Winter Nelis (bad on foliage, not much on fruit), Brown Beurré, Gansell's Bergamot, Beurré Diel, Black Accan.

As the effect of spraying is more noticeable on the more tender varieties that are particularly liable to the black spot, I have in all the orchards that I have visited paid particular attention to the New York Pippin, Adams Pearmain, and Scarlet Pearmain, as those varieties are especially liable to injury by it; and, moreover, are very largely grown.

SPRAYED FOR COUNCIL.

W. F. CASEY, CASTLE FORBES BAY.

Part of his orchard lent to Council for experiment, and consisting of 19 rows of trees, covering $2\frac{1}{2}$ acres.

Trees mostly about 13 years of age, and principally Sturmers, Crabs, and Russets, a few New Yorks, Ribstones, and Scarlets.

In this orchard the cleanest trees are those of rows 17 and 18, that were done with Bordeaux mixture on September 12, just when the blossoms were showing. The other rows done with Bordeaux mixture are certainly cleaner than the unsprayed rows or rows treated with other substances (viz., kainit, 5lbs. to tree; formalin, 2oz. to gallon; kerosene emulsion, phenyle, $\frac{3}{4}$ oz.; softsoap, $\frac{1}{2}$ lb. to gallon; Porpoise oil, 1 gallon; softsoap, 1lb.; water, 15 gallons), but the November sprayings, especially with Eau Celeste, injuriously affected the foliage and the fruit.

J. O'BEIRNE, EGG ISLAND, FRANKLIN.

Orchard consisting of 19 rows of trees covering $3\frac{1}{2}$ acres, lent to Council for experiments.

Trees mostly from 10 to 15 years of age, and principally Sturmers, Scarlets, and Adams, a few Crabs and New Yorks.

So far as I can judge from an examination of this orchard, made on March 22, in company with Mr. O'Beirne, the spraying done even with Bordeaux mixture does not appear to have had the least effect upon the spot. It was then impossible to tell from the condition of the fruit which trees had been sprayed and which had not. In fact, some of the unsprayed trees had cleaner fruit than some of the sprayed.

The conditions prevailing at this orchard render any spraying test for "Black Spot" excessively severe. It stands on a small, low island, is totally deficient in lime, and during parts of the year a hole could nowhere be dug to a depth of 5ft. without touching water.

In the 1898-9 season, although there were several hundreds of bushels on the trees, none was fit to be exported, and very little could be used even at a drying factory.

In the experiments carried out by the Council river water was used. This water was decidedly brackish, so much so that kerosene emulsion could not be made with it.

NOTE, ON MAY 14, BY MR. O'BEIRNE.—"I do not think there is much to be added to your report, as it bears out what is the actual state of affairs. I noticed that in picking Crow's Eggs where formalin was used, in row 7, the fruit was much cleaner than 8 and 9 of the same kind of apple. And that the Adams Pearmain and Scarlet Pearmain throughout the orchard (also throughout the whole of the district) were worthless. I have also noticed that since the wet weather set in the spot has spread very rapidly upon Sturmers and Crabs

JOHN HAY No. 2, FRANKLIN.

Part of his orchard lent to Council for experiment, and consisting of three rows of trees covering $\frac{1}{4}$ of an acre.

Mr. Hay's "Billius" pump used.

Queensland bonedust and Webster's potash manures used.

Land well drained and cultivated.

NOT SPRAYED.

NOTE.—March 28. Last year very badly spotted, but this year improved through drainage; still spot bad, but not nearly so bad as in some of the orchards visited. Adams, Scarlets and Crow's Eggs are badly, the New Yorks very badly spotted. A few of the latter, however, that were treated with nitrate of potash are rather clean, but where too much used trees scorched.

W. F. CASEY, CASTLE FORBES BAY.

First spray, Bordeaux mixture in June, 7lb. bluestone to 30 gallons.

Second spray, Bordeaux mixture, 1lb. bluestone to 10 gallons, in September, when buds had burst, and the blossoms were sticking well up, and showing pink.

NOTE.—March 22, Mr. Casey took me to a small orchard he is renting, and which was treated as above this season; last season it was not sprayed, and he could only pick 32 cases of inferior Scarlets. These were condemned in Sydney, but afterwards sold in Brisbane. This year he expects fully 200 bushels of Scarlets, that will go anywhere. He is perfectly satisfied with the results he has obtained, and intends to continue spraying. The orchard is certainly very free from spot; very few of Scarlets and New Yorks are spotted. On the other side of the fence an orchard that was not treated is in very bad condition. Indeed, I do not think that one sound Scarlet or New York could be obtained from it. The conditions of these two orchards are well known and freely commented upon.

J. E. BLACKMAN, J.P., CASTLE FORBES BAY.

Sprayed with Bordeaux mixture just as blossoms showing, putting as much lime into the mixture as it was possible to get.

Land recently well drained.

This orchard and that of Mr. W. Skinner, and of J. Rowe are about equally clean.

NOTE.—March 29, Mr. Blackman informs me that he has 16 acres of apples, eight of which are principally Scarlets. Two years ago all he obtained from the Scarlets was £2 Os. 11d., except jam apples. This year he expects 2,000 cases of splendid fruit, and will not lose 1 per cent. through spot. Scarlets, New Yorks and Adams beautifully clean, Crow's Eggs very clean. Owing to its position one tree could only be partly sprayed. This part was clean, whilst the unsprayed part was dirty. Also, he has eight trees so situated that he could only get the spray-pump to work on four of them. The fruit on the unsprayed is good—for nothing. Mr. Blackman writes me that three weeks prior to my visit he "could scarcely find a spotted apple, and then only on Adams and Crow's Egg," and that all the spot now on his fruit has appeared quite recently, as may be seen by the condition of the apples.

JAMES ROWE, CRADOCK.

Sprayed with Bordeaux mixture. No previous spray.

First spray of extra strength in middle of winter.

Second spray just as buds beginning to break.

Third spray when apples the size of marbles.

NOTE.—March 24, this orchard is in excellent condition as regards spot, and Mr. Rowe reckons he will not lose 5 per cent. of fruit through spot, although last year it was in very bad condition. He is perfectly satisfied with and intends to continue spraying.

This year he expects to have 220 bushels of New Yorks.

Last year he had 6 bushels.

The year before 6 bushels.

This year he expects to have 300 bushels of Scarlets

Last year he had 30 bushels.

The year before 50 bushels.

This year he expects to have 130 bushels of Adams.

Last year he had 5 bushels.

The year before 60 bushels.

BORDEAUX MIXTURE.

This mixture first came into notice as a remedy for fungus diseases in 1882, since when it has come into almost universal use. Publications, in which details are given of its use and preparation, are many, but I have selected one of the latest, and probably the best, for notes on its preparation.*

**Farmers' Bulletin*, No. 38, Spraying for Fruit Diseases, by Professor B. T. Galloway, Chief of Division of Vegetable Physiology and Pathology of the United States Department of Agriculture, Washington, 1896.

"Bordeaux mixture has long been recognised as possessing the most valuable qualities, and it is probably more used to-day than all other fungicides combined. The chief points in its favor are (1) its thorough effectiveness as a fungicide, (2) its cheapness, (3) its safety from a hygienic standpoint, (4) its harmlessness to the sprayed plant, and (5) its beneficial effects on plants other than those resulting from the mere prevention of the attacks of parasites.

"All things considered, it is believed that the best results will be obtained from the use of what is known as the 50-gallon formula of this preparation. This contains—

Water	50 gallons.
Copper sulphate (bluestone)	6lb.
Unslacked lime	4lb.

"It has been found that the method of combining the ingredients has an important bearing on both the chemical composition and physical structure of the mixture. For example, if the copper sulphate is dissolved in a small quantity of water and the lime milk diluted to a limited extent only, there results, when these materials are brought together, a thick mixture, having strikingly different characters from one made by pouring together weak solutions of lime and copper sulphate. Where the mixture has been properly made there is scarcely any settling after an hour, while the improperly made mixture has settled more than a half.

"Briefly, the best results have been obtained from the use of Bordeaux mixture made in accordance with the following directions: In a barrel, or other suitable vessel, place 25 gallons of water. Weigh out 6 pounds of copper sulphate, then tie the same in a piece of coarse gunny sack, and suspend it just beneath the surface of the water. In another vessel slack 4 pounds of lime, using care in order to obtain a smooth paste, free from grit and small lumps. When the lime is slacked add sufficient water to the paste to bring the whole up to 25 gallons. When the copper sulphate is entirely dissolved and the lime is cool, pour the lime milk and copper solution slowly together into a barrel holding 50 gallons. The milk of lime should be thoroughly stirred before pouring. The method described insures good mixing, but to complete the work the barrel of liquid should receive a final stirring for at least three minutes.

In Tasmania it appears to be difficult to obtain a really good lime free from grit. Probably, therefore, as much lime as bluestone will be required to make a good mixture. Fresh lime should in all cases be used.

"It is probable that the use of air-slacked lime not only causes injury from leaving a small amount of copper sulphate in solution, but from the formation of the basic sulphate of copper, which in itself is injurious. In the use of Bordeaux mixture prepared with freshly slacked lime it is conceivable that injury may occasionally result if the two solutions are not thoroughly mixed and the solutions of copper sulphate and lime are too concentrated." (Fairchild).

If too much bluestone is in the Bordeaux mixture it will scorch the leaves and young fruit; but this will not be the case if too much lime is present. A simple test is to place a shining nail or the blade

of a knife in the mixture, when, if too much bluestone is present, in about one minute the nail, or knife, will become discoloured, whilst if there is a sufficiency of lime no alteration will take place.

In winter the mixture can be used at a considerably greater strength without injury. But after the fruit is well developed it should be weaker, otherwise it is liable to mark the fruit.

SUMMARY.

From the foregoing it may be seen that "Black Spot" is a fungus disease that is especially bad in damp seasons and districts, and that three things are necessary to keep it in subjection—

1. To have well drained land.
2. To have a sufficiency of lime in the orchard.
3. To spray the trees with Bordeaux mixture.

The Bordeaux mixture should be applied in the winter, *and again in the spring, when the blossoms are just beginning to show*; it may be necessary to spray later on, but the most important spray is decidedly the one when the blossoms are just showing.

PRESERVING WHEELS.

Oiling waggon wheels to preserve the felloes and prevent the tires becoming loose, has been practiced by many for a long time. It is better as a preventive than a cure for loose tires. Stop the swelling and shrinking of the felloes and the rusting of the under side of the tire next the felloe by a coating of oil. Fill the tenons of the spokes also with hot oil, and, you have at least doubled the life of your wheel. If it is well done, a tire will never have to be reset. The tenons of the spokes cannot swell and split the felloes. The mistake made is that people do not begin with their wheels in time. Treat the wheel while it is sound. Have it well dried out, give it time to absorb all the oil it will take. Use the best boiled linseed oil, with about one-half pint liquid drier to the gallon. Devote at least one hour to a wheel. The oil should be kept up to nearly the boiling point, and the slower the wheel is revolved the more oil will get under the tire, where most needed. Two revolutions of the wheel in an hour is about right. Revolving slowly heats the wood through. This drives out any moisture, the pores readily drink their fill of hot oil, and by the time the wheel has made its second revolution some of the last coating will remain upon the surface. A portion of this will gradually be absorbed into the wood, and the remainder will dry hard upon the surface. The oil should not boil, but must be quite hot—hot enough to expand the tire so that the oil will get under it freely. A light finely-painted wheel should be immersed in the oil, say about half an inch above the tire, as it is between the tire and the felloe that the oil is needed. For coarser jobs, or when the paint is considerably worn, immerse an inch above the depth of the felloe. This will fill the joints around the shoulders of the spokes.—*American Agriculturist*.

DISEASE IN HORSES.

REPORT BY INSPECTOR WEIR.

The Chief Inspector of Stock has received the following report from Inspector Weir, who recently proceeded to Lennonville to report on an epidemic among horses:—"I have the honor to report having visited Lennonville, according to your instructions, on Friday last, for the purpose of investigating a mortality prevailing among horses in that district. It appears that the outbreak first occurred among the horses employed in supplying timber to the mines, and afterwards extended to others, which were used for varied purposes. Within a short space of time a mortality of eight occurred in close proximity to one another, and, as other losses were reported from outside districts, a feeling of uneasiness prevailed among the various owners, more especially as the majority of the animals were of heavy draught, a class difficult to replace in the district. One teamster lost his all in two valuable horses, and thereby his means of livelihood. Owing to the fact that all the badly-affected animals were dead, and those showing slight symptoms only were practically recovered, a difficulty was at first experienced in diagnosing the disease, which was ultimately recognised as 'epizootic catarrh,' or more familiarly known as influenza. The cause was to be found in the unusual climatic conditions prevailing in the Murchison district during the past few months. Heavy rains, with cold winds, have been the rule, and, as the horses were always exposed at night in open yards, the natural heat of the body consequently became impaired, and left them liable to be attacked from disease. The heavy mortality was entirely due to their being kept at work until collapse had taken place, when it would have been impossible to have effected a cure, even with the most careful treatment. As a prevention, the future stabling of the animals at nights has been recommended, as also the necessary treatment in case of attack, but for the benefit of others the following symptoms and treatment of the disease will be found serviceable:—In the early stages the animal shows dulness with head depressed, extremities cold, watery discharge from the eyes and nostrils, soreness of the throat, as indicated by the difficulty in either swallowing food or water, difficulty in moving about, and appearing as if partially paralysed. As the disease has a definite course to run, the treatment can only be palliative. The affected animal should be placed in a warm, comfortable building, and the body rugged; food, consisting of warm mash of bran and chaff and a supply of cold water in a convenient place for the animal to drink, inhalations of steam for an hour at a time will afford relief, and mustard should be applied to the throat. To reduce the existing fever, one half-ounce of spirits of nitros-æther or two drams of carbonate of ammonia should be given twice daily in the drinking water."

CYANIDING TENTS.

By ALBERT H. BENSON.

(*Queensland Agricultural Journal.*)

A number of inquiries having been received by this Department as to the material required and method of making bell tents and sheets for cyaniding fruit trees, the following information, together with the accompanying illustrations, showing the method of cutting the cloth, will, I trust, prove of value to fruitgrowers.

In the first place, as to material, we have tried many different kinds, with the result that we are now using nothing but the very best quality of duck; the particular brand that we have found most satisfactory being marked "Heavy Cotton Duck Canada D," in an oval.

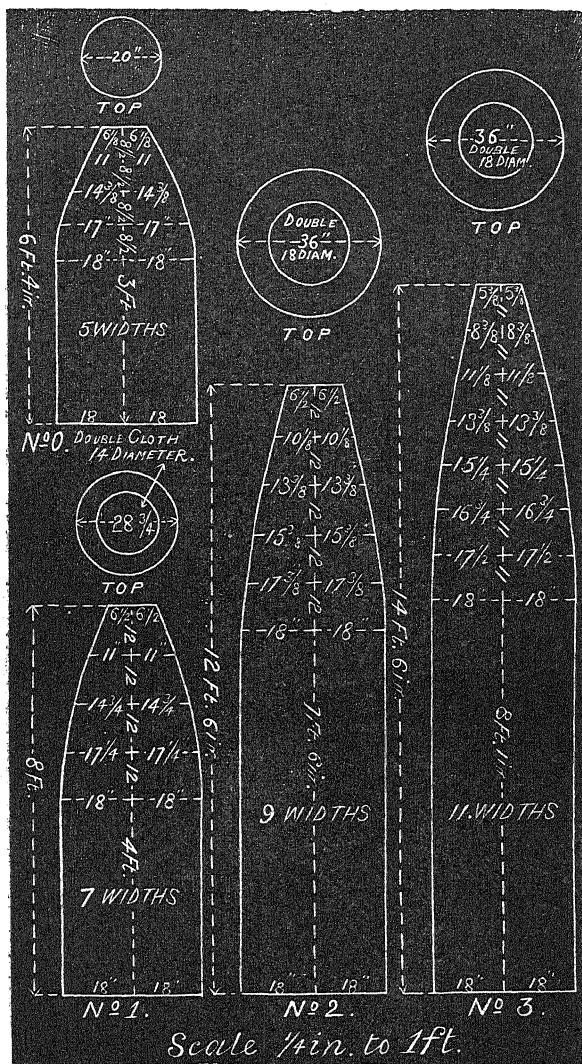
We are also using what is known as the Willesden rot-proof canvas, which is a first-class quality 16-oz. duck, treated with a copper solution in order to render it more lasting, and to prevent it becoming mildewed. This material is giving very satisfactory results, being more gas tight than any undressed duck. We are also testing a finely woven but much lighter texture of duck, which, so far, promises to be very suitable, but, before recommending same for large sheets, we purpose testing it thoroughly.

No first-class duck requires to be treated with oil, or other similar substance, to render it gas-tight, as it is sufficiently gas-tight for all practical purposes without any such treatment. At the same time it is advisable to tan both bell tents and sheets by placing them in a strong tan bath, the tanning material used being either wattle-bark, ironbark, din-din, or other suitable tanning material.

The object of this tanning is to prevent the tents or sheets from rotting, or from being covered with mildew. In the case of the two smaller sizes of bell tents, lighter material, such as strong calico or Mexican sheeting, may be used, provided that it is thoroughly dressed with raw linseed oil, but, though more gas-tight, it will not be as strong or as durable as the best quality duck, as the oil has a tendency to rot the material to which it is applied. If oiled tents or sheets are used, they must be thoroughly dried before they are folded up, otherwise there is every chance of their being destroyed by spontaneous combustion. In the Departmental outfit we are at present using five sizes of bell tents, but as we have found by experience that the largest size now in use is unwieldy, we shall make no more of this size, but stick to the four sizes, particulars of which are given below, and the method of cutting the cloth for which is given in the accompanying illustration. The illustration, which explains itself, is reproduced from drawings and calculations that have been made by Mr. J. Henderson, the manager of the Redland Bay Experiment Orchard, who had charge of the cyaniding outfit for several months.

SKETCHES OF BELL TENTS NOS. 0, 1, 2 AND 3.

Showing dimension for cutting widths and tops. One inch is the width allowed for all seams. All measurements are given in feet and inches.



NOTE.—No. 0 covers trees 4 1/2 ft. diameter by 5 ft. high. No. 1 covers trees 6 1/2 ft. diam. by 7 ft. high. No. 2 covers trees 8 ft. diam. by 11 ft. high. No. 3 covers trees 10 1/2 ft. diam. by 12 ft. high.

No. 0 Bell Tent is made of five widths of 36-inch duck, 6 feet 4 inches long, and will treat trees up to $4\frac{1}{2}$ feet in diameter by 5 feet in height.

No. 1 Bell Tent is made of seven widths of 36-inch duck, 8 feet long, and will treat trees up to $6\frac{1}{2}$ feet in diameter by 7 feet in height.

No. 2 Bell Tent is made of nine widths of 36-inch duck, 12 feet 6 inches long, and will cover trees up to 8 feet in diameter by 11 feet in height.

No. 3 Bell Tent is made of eleven widths of 36-in duck, 14 feet 6 inches long, and will cover trees up to $10\frac{1}{2}$ feet in diameter by 12 feet in height.

Even larger trees than those given can be covered by the various sizes of tents by tying in straggling growths, and thus bringing them within the measurements given. In order to cut out the duck so as to get the dome of the tent exact, cut off a length of duck according to the size of the tent you desire to make, and fasten it securely to a floor. Run a chalk line the whole length of the cloth from centre to centre, and set off cross lines at right angles to this centre line with a square, at the distances given in the plan. Mark off on these cross lines the distances as per plan, and connect same with a curved line, which is the line on which the cloth is cut. Having cut out one width, it is an easy matter to cut out as many as may be required.

All the sewing can be done by machine, using a strong linen thread (No. 26) and making about ten stitches to the inch. All seams have a lap of an inch, and are sewn with two—or better still—three rows of stitches. As shown in the plan, the top of the tent (the cap) is circular, and the method of sewing adopted is as follows:—"First sew three or four widths together, then sew the top on to them; then add three or four more widths and complete sewing the top to them, and so on, till you arrive at the last seam, then complete sewing on the top. When this is done, you start the last seam at the top, and complete the three rows of stitching for a yard or so down, or as much as the machine can take, and continue sewing in short laps until complete."

The above method of making a tent is that adopted by Mr. Henderson, and experience has proved it to be satisfactory. In tents Nos. 1, 2, and 3, an extra circle of duck is sewn on to the apex of the tent, and to which is attached a ring of $1\frac{1}{2}$ inch rope, about 5 inches in diameter, with which the tent is placed on and taken off the tree to be treated. In tents No. 2 and No. 3, four hobble rings are sewn on to the bottom edge of the tent, equidistant from each other, with which to put the tents over the trees, as the rings of gaspiping used in our first tents have been done away with, and this method of placing the tents over the trees substituted for it. In addition to bell tents, we use three sizes of sheets which are approximately 40, 50, and 56 feet in diameter respectively. A 40 foot sheet will cover trees about 15 feet in diameter by 15 feet in height; a 50-foot sheet, trees about 20 feet in diameter by 20 feet high; and a 56-foot sheet, trees about 20 feet in diameter by 24 feet in height.

Larger trees require two or more sheets, as sheets above 56 feet in diameter, if made of heavy duck, are too heavy and cumbersome to be worked satisfactorily.

All sheets are octagonal in shape, each side being of equal length.

A 40-foot sheet is made of fourteen widths of 36 inch duck, of which six widths are cut 41 feet 3 inches long, which, after allowing for a lap of 2 inches at each end to prevent fraying-out, gives a diameter the long way of the cloth of 40 feet 11 inches. This is equal to the diameter across the widths of the cloth, as fourteen widths give 42 feet less 13 inches for seams, or a width of 40 feet 11 inches in all.

On each side of the six widths going the whole diameter of the sheet are four widths, which, instead of being cut off square, are cut at an angle of 45 degrees, as this angle will produce a regular octagon. In order to get an angle of 45 degrees, mark off one yard of cloth, and draw a line from corner to corner diagonally across it, and you will get what you require. There is no waste in this method of cutting out, every particle of duck being used.

A 50-foot sheet is made of seventeen widths of 36-inch duck, of which seven widths are cut 50 feet long, which, after allowing 4 inches for the ends, gives a diameter the long way of 49 feet 8 inches, the same as that obtained by the seventeen widths, or 51 feet less 16 inches for seams. There are five widths on either side of the seven through widths, and they are cut in the same manner as that described for the 40-foot tent. A 56-foot tent is made the same way as a 50-foot, with the exception that a 3-foot width of duck is sewn on all round it. These measurements do not give absolutely correct octagons, but they are near enough for all practical purposes.

REPORT ON EXPERIMENTS CARRIED OUT AT THE EXPERIMENTAL PLOTS AT DRAKESBROOK.

The following report has been received by the Secretary for Agriculture from Mr. G. F. Berthoud:—

COTTON PLOTS.

Gossypium.—Seeds of all the sorts tested were sown on new land, good sandy loam, low and moist, but fairly drained, and well tilled, the width between the drills 3ft., and the plants 2ft. apart in the rows. Manure, at the rate of 4cwt. per acre in the drills, composed of four parts superphosphate, one part sulphate of potash, one part sulphate of ammonia. During the growing season and summer months the soil remained fairly moist and in good condition for

healthy growth. Nearly all the first lot of young plants were eaten off by the brown grubs, who are very partial to this plant when in the early stages of growth. The plots had to be resown, which caused the crop to ripen somewhat later than it should have done. The young plants grow slowly at first, or until the weather gets warm. Of all the kinds tried, the two best for general culture would be "Egyptian" and "Upland." However, it is very doubtful if even these two could be grown for profit in this locality, the early rains in autumn may damage or discolor the fibre. Most varieties would do well in suitable soil in the North-west. Here, the seasons are too cool and wet.

COTTON TESTS, 1899-1900.

Upland.—Seed sown 19th September, up 1st October, germination fairly good. Growth free and compact. Height of plants when mature, 30in., fairly prolific, about 25 bolls or pods per plant. First pods ripe 20th April, fibre pure, white and good.

Egyptian.—Sown 19th September, up 27th September, germination even and good. Growth vigorous and fine. Mature height, 30in. About 30 pods per plant. First pods ripe 20th April. Pods large, fibre white, long and silky. One of the best sorts grown here.

Tree Cotton.—Sown 19th September, up 27th September. Growth strong and tall. Mature height, 4ft. Pods rather small about 20 to a plant. Ripe 16th May to 18th June. Late, not suitable for this locality.

Louisiana.—Sown 19th September, up 26th September, germination even and good. Growth good. Height 3ft., fairly prolific, about 22 pods per plant. Ripe 1st May to mid-June. This is a fairly good sort.

Cotton Mit Affi.—This is a new variety from Egypt. Sown 19th September, up 26th September, germination even and good. Growth, healthy and vigorous. Mature height of plant, 3ft. 6in. Pods long, about 20 per plant. Ripens very unevenly towards end of June, fibre long, of a pale tawny colour. Not suitable for this district.

Louisiana Prolific.—Sown 19th September, up 27th September, germination good. Growth fairly good. Mature height, 30in. Not very productive, about 18 pods per plant. Ripe late in June. Not desirable.

Naukin.—Seed sown 19th September, up 27th September, germination fairly good. Growth slow and weak. Mature height, 30in. Not productive, about 15 pods per plant. Ripe late in June. Not suitable for this district. Fibre distinct, of a deep tawny colour.

Abassy.—New variety from Egypt. Sown 19th September, up 25th September, germination very strong and fine. Growth vigorous and branching. Mature height, 3ft. Pods about 24 to plant. Ripe from 18th May to 20th June. Fibre long, white and good. Would be a good variety for warm climate.

Sea Island Cotton.—Sown 19th September, up (few) 27th September. Growth weak. This sort failed to mature any pods; plants died off.

Georgia Upland.—Sown 19th September, up 27th September, germination good. Growth fair. Mature height, 2ft. 3in. Pods about 18 per plant. Ripens end of May to mid-June; too late to be useful here.

Higan Ghat, India.—Sown 19th September, up 27th September, germination uneven. Growth weak. Plants died and failed to mature pods.

New Orleans, America.—Sown 19th September, up (few) 28th September. Growth weak. Failed to mature any pods.

Gara Hill, India.—Sown 19th September, up 28th September. Few weak plants, which died off before maturing any pods.

MILK AVERAGES.

Watering the milk is a form of adulteration at once dishonest and injurious to health. It is especially injurious to the health of those, like young children, whose chief nutriment is supplied by milk. One of the commonest duties of the public analyst is to examine samples of milk sent for analysis under the Food and Drugs Act, and it is important that the standard demanded by law, whilst protecting the consumer, should not in any case be prejudicial to the honest provider. The rough and ready test of purity by taking the specific gravity, which is sometimes resorted to in private households, is insufficient unless the percentage of fat (cream) in the sample of milk is also determined. There is a tale told of a public institution, which demanded so high a specific gravity in the milk supplied, that the supplier could only fulfil his contract by skimming off some of the cream before delivery. The purity of milk is tested by determining both the total solids and the percentage of fat. The composition of milk, however, varies somewhat in different breeds of cattle, and is influenced by the season, and by the kinds of food. It is thus impossible to demand an absolute standard, except by fixing a minimum of purity. The public analyst for Dundee, Mr. G. D. Macdougald, has published some charts or curves of milk averages, showing the variations in the monthly average quality of 12,069 milks, examined from July, 1897, to February, 1900. The average composition of the entire series is as follows:—Fat, 3·82 per cent.; non-fatty solids, 8·68 per cent.; total solids, 12·50 per cent. Mr. Macdougald's results support the opinion that a standard of 3 per cent. fat, and 8·5 per cent. non-fatty solids (about the usually accepted standard for a good milk) would not entail any hardship whatever on the producer, and that even a 3·25 per cent. standard of fat would not be too high. The curves shown by Mr. Macdougald show little regularity in the variations for the different months, except that in the months of August and September the non-fatty solids were generally very low.

—*British Medical Journal*.

THE SAN JOSÉ SCALE.

A DESCRIPTION OF THE PEST AND THE TREATMENT FOR IT.

Long Beach Press: While the literature of the San Jose scale has been amazingly abundant during the past few years, in most parts of the world, so little has been said about it in California that the younger generation of fruit-growers are in danger of forgetting all about it. The following from the *Long Beach Press*, with comment by the *Los Angeles Times*, will be an interesting reminder of the times when Californians also were afraid of this scale:

About the middle of May in this latitude (October in Australia) the young commence to appear, this species differing from most scale insects in being *viviparous*, no eggs being found. This giving birth to countless young continues for about six weeks. The first born are reproducing themselves before the parent has finished her litter. The interlapping of the different broods makes it very difficult to decide how many generations there are in each season, but a close observation shows that there is a continual production daily from the middle of May to the end of September. (April in Australia).

The first stage of the San José scale is in the larval, in which it appears as an oval, pale yellow mite, furnished with six legs, a pair of feelers, eyes and all the necessary appendages of an ordinary insect. In this condition they may be readily seen with a common pocket glass wandering sluggishly over the tree seeking a permanent location. It is of vital importance to them that they quickly succeed in finding it, for, within the next forty or fifty hours, there comes a great change in their life. The power of locomotion is lost, the legs are absorbed into the body, the eyes and antennae disappear, and in their place is developed the long sucking tube or beak, consisting of a bundle of fine hairs, or bristles, which the insect quickly inserts through the bark into the succulent tissues, through which flows the sap of the tree. The shell is then formed around the insect by successive layers of waxy secretions, and the female becomes a fixture for the remainder of her existence.

A remedy which has proved of value in the State is the lime, sulphur, and salt wash, the formula for which may be obtained from the Horticultural Commission or from any of the inspectors. Success with this wash, as with all others, depends very largely upon the manner of using it. Good materials should be procured in the first place, and the cooking of them should be prolonged until the sulphur is completely incorporated. One of the prime factors of success with this wash is the permanent coating left upon the tree, which presents an obstacle in the way of, or at least makes it very unpleasant for, the delicate young larva to find a suitable location in the short time allowed by nature.

Many reported failures to obtain good results from spraying are due to the carelessness of those who do the work. Sometimes a tree is sprayed when it is wet all over. "Squirting a few quarts of water at a tree as you trot past is not spraying," nor is it good and sufficient

ground for the statement that the spraying did no good. It must be remembered that the bug is a fixture, and to be effective the solution must reach every spot.

In conclusion the article says: "A method of combating this pest, which, in the knowledge of the writer, has never been tried in this part of the State, would be to fumigate with hydrocyanic gas about the middle of June. This would give the old females that had wintered over an opportunity to have finished breeding, and the young scale would then be in a condition to be easily reached by the gas. This would seem to be the ideal method of controlling such cases where a single badly infested tree is threatening the entire orchard, and is probably worth making a test of."

Comment by the *Los Angeles Times*: Authorities differ as to whether the San Jose scale is *viviparous*, many entomologists claiming it is not. Fumigation has been tried successfully in the San Gabriel valley, but the cost being very heavy at that time (eight years ago) the use of hydrocyanic gas was abandoned by the deciduous growers. The San Jose scale is pronounced the most prolific and pernicious of all the numerous tribes of scale pests, but, happily, it may be easily killed by gassing, and largely controlled by using washes with a persistent body, such as is formed by lime, sulphur, and salt, well cooked together. For the coating so necessary to prevent the young scale getting a hold, the lime proportions should be very heavy. Along the coast regions, fifty parts of unslaked lime should be used to twenty of sulphur, and fifteen of salt. The best way of mixing the above ingredients to secure a whitewash that shall flow readily through the sprayer is as follows: Ten pounds of lime, twenty pounds of sulphur, and twenty gallons of water should be placed in a kettle and boiled for half an hour. Then place in a tight box the forty pounds of lime, with enough soft water to slake it. After the lime is thoroughly slaked, add fifteen pounds of salt, dissolved previously in water, and stir the two lots together, adding enough water to make sixty gallons of the mixture. The concoction should then be strained through a burlap sack and it is ready for the sprayer. The material will adhere readily to the tree and remain long enough even in the damp coast air to prevent the scale getting a hold. We would advise the application of gas as the surest, and in the end, cheapest remedy.

DAMAGES FOR TREES UNTRUE TO NAME.

The *Allegan Gazette* (Mich.) reports a case as follows: After a three-days trial a case has been concluded in the Kent circuit court which is of much interest to fruit growers and nurserymen. It was brought by Peter L. Long against John Prun, upon a claim for 2,500 dol. damages. Prun sold Long a lot of trees which proved to be not what was represented, and they bore only worthless fruit. The jury gave a verdict of 975 dol. for Long, basing their finding on the comparative value of Long's farm with its worthless trees and what it would be worth were the trees true to name. At least one other such case has been decided against Prun.

ABORTION IN LIVE STOCK.

BY H. H. EDWARDS, Veterinary Surgeon.

Abortion—known better perhaps by such names as “miscarriage,” “slipping” or “slinking” the young, may be defined as a premature delivery of the foetus. A distinction has been made by veterinary authors between abortion and premature labor, but, as each has its origin in the same cause, whatever it might be, and as the aborted foetus would be incapable of living, and the one brought into the world by premature labor a worthless object, it seems like wasting time to keep up the distinction. However, I intend just to set down my own ideas, and if there should be any trespass into the realms of premature labor while dealing with abortion, I crave the indulgence of those who marked the boundary. As a fact, a man would far rather have his cow abort than have her calve before her offspring had come to a state of foetal maturity; for not only is the calf a weakling but many troubles are in waiting for the mother, as soon as the first one is over. The standard writers, it must be stated, make a distinction between premature birth during the first six months of gestation in the cow, and that which takes place during the last three, calling the former abortion and placing the latter under the heading of premature labor.

THE CAUSES.

It will be well to take the case of the bovine subject first, and to place the causes in order as to prevalence, they may be set down as follows:—

1. To being fed upon ergotised or musty fodder.
2. To being subjected to the smell from an already delivered cow.
3. To being kept on pasture water deficient in lime salts.
Americans say this is a decided cause.
4. To being over-driven whilst heavy in calf.
5. To being subjected to the influences of a bulling cow.
6. To being subjected to the smell of decaying organic matter, more particularly blood.
7. To being purged by remedies calculated to prevent diseases which occur after calving, such as parturient apoplexy, mammitis, etc.
8. To being affected by any disease which affects the system generally.
9. To being grazed on hilly country.
10. To rough voyages at sea.

Taking these causes seriatim. In regard to No. 1 it is well known that ergot of rye (in all kinds of preparations) is used all the world over to induce and increase uterine labor. From time to time its action has been doubted, but suffice it to say that it is universally used for that purpose to-day, both in human and veterinary practice. Cows grazed upon broad acres of ergotised rye, therefore, are at once rendered abortive subjects.

2. It is a well-known fact that cows in calf, herded with a cow that calves in their presence, are apt to short or slip their young. Early in the history of cattle raisers it was determined that the smell of the urine was liable for the abnormal action of the offenders, and it can be borne out by herders of highly bred or highly conditioned stock that such is the case to-day. It is judicious, therefore, for breeders of high class cattle to isolate cows on the point of calving as much as possible.

3. No good reason has yet been urged for the prevalence of abortion in districts deficient in those mineral compounds which are essential to the proper growth and development of the Herbivora. American authorities are unanimous in the belief that the cause and effect evidently, though no theory has been advanced why, a system yearning for mineral salts should even favour abortion. The space, therefore, between cause and effect is a mist through which the light of science cannot penetrate. There may be some reason for this, and there may be some significance in the fact, that the Agricultural Department of this colony had analyses made of water taken from various parts of the Southern districts which gave results proving that, while the water in some localities was rich in lime salts, that of others was absolutely destitute of the same. Now, strange to say, our experience is that abortion in cattle is common among the herds of the S.W. coast country and almost unknown in those inland ironstone districts for which the analyst returned such discouraging results. These facts urge me to say that, with further investigation, it may yet be found that some more powerful local cause is to blame in those vast American districts for the wholesale abortion about which men write.

4. Every boy reared on a farm is taught from his early youth to drive a cow, heavy in calf, slowly. If he were being well brought up he would be made to drive a cow in any condition slowly. Nothing is more dangerous for a cow, within a month or two of calving, to be hustled about by a yokel on horseback. I say this advisedly, because if the trouble should not be brought about by the equestrians referred to, there must be an ill-advised cattle dog in the matter. There are no cases on record of embryonic farmers having done any harm on foot. The physiology of the ox tribe demands restfulness and ease, and cows in calf must have these essentials, for to violently disturb the nervous system is an almost certain way of inducing abortion.

5. A bulling cow herded with forward springers is a great source of danger. All cattle owners know that if the antics displayed by one cow and another do not cause some of the springers to abort, they so disturb the foetus in its bed, that trouble at calving time will ensue. When veterinary assistance is obtained on account of mal-presentations it is commonly found that the cow has been subjected to the influences and ravages of their rutting sisters.

6. The sense of smell in the lower animals is most acute, and that of the cow is particularly susceptible to the strong smell of such

organic matter as decomposing flesh or even fresh blood. A cow will stand over the spot where an animal has been buried, paw the ground and roar herself into a state of wild excitement and behaviour, which means little to the non-pregnant animals, but which ushers in abortion in the pregnant cow almost for a certainty.

7. It is a common practice with many people to give a drastic drench to a full-blooded cow before she calves in order to prevent puerperal apoplexy, inflammation of the udder or other troubles which attend parturition. Such a drench has the effect of exciting the uterus to contract upon its contents, and thereby cause the cow to abort. There is a strong physiological reason for this which may not be discussed here, but which will be noticed under the heading of "Premature Labor."

8. Whenever a pregnant cow becomes the subject of disease, more especially if it be a fever, she is almost sure to slip or abort her calf. In cases of contagious pleuro pneumonia for instance, it may be taken for granted at the outset that if the cow be in calf she will abort. The many changes, both functional and organic, which take place in the system during a severe illness easily account for this; and when we know what a great factor a little violation of the laws of physiology is in bringing on abortion, it is easy to understand how powerful this cause must be.

9. It must have come under the notice of many that the heavier breeds of cattle, more particularly "shorthorns," are apt to evert the vagina when lying on slanting ground. That is to say, that through the gravity of their own bulky body and the abnormal muscular exertion while, perhaps, in a condition of constipation when the animal is lying with its head up hill, eversion of the vagina commonly takes place. This is a trouble with which veterinary surgeons often have to cope. Now when this happens to a pregnant cow it will be very easily understood that the very irritation and pain which attend such an accident bring about the abortion of the foetus.

10. All experienced shippers of cattle know that pregnant cows, especially forward springers, are apt to abort on a rough voyage. The Great Australian Bight is responsible for many a case of abortion in highly pregnant animals of all kinds, and it is clear from the experience of importers of dairy stock into the colony that it is unwise to chance a cow's fate on a broad ocean unless she is only four or five months "gone in calf."

PREVENTIVE MEASURES.

The causes of abortion having been pointed out, it remains for those who suffer the losses to remove them, or at all events to guard against the evil factor of their own particular source of trouble. No good can possibly be done when once the cow has actually begun to evacuate her womb, the nervous system has begun its work and it must be finished.

(To be continued.)

DIRECTIONS FOR THE PREPARATION OF BOTANICAL SPECIMENS.

Specimens for the Herbarium are prepared by pressing plants or parts of plants between sheets of absorbent paper. The whole plant with root should be preserved whenever practicable, but if too large the most important parts are to be taken, namely, the flowers, fruit, leaves, and in some cases the root. A flowering branch of a tree or shrub may suffice, while long thin plants may be doubled up once or oftener before pressing, and very bushy ones should have their branches thinned out; but each specimen after it is pressed should not exceed 16in. in length by about 10in. in width. The leaves springing from the top of the root should be preserved as well as those situated higher up, and also the root itself, especially if different from the ordinary fibrous form. Specimens should be so chosen as to furnish the greatest possible amount of information about the plant represented, and should be so prepared as to preserve as far as possible the natural appearance of the plant.

While the specimens are still fresh, spread each out on a layer of several sheets of absorbent paper, cover carefully with another layer of sheets, and repeat the process till a number of such layers are built up, taking care to avoid placing the thicker parts of the specimens at the same spot. Pressure is then applied, gentle at first, but increased the next day, the object being to keep the parts of the specimen spread out so as to be well displayed when dry, without unduly crushing the soft and delicate tissues. Harsh spiny plants may require to be placed between boards and stood upon in order to flatten them.

Next morning the papers will be quite damp, so that the specimens must be changed into dry sheets, daily for the first three days, then every other day till the 8th or 10th, by which time most plants will be dry. If enclosed first of all within a folded sheet of strong tissue paper or the thinner qualities of newspaper, this sheet may be more easily transferred from the damp to dry paper without disturbing the specimens, and this method is specially desirable for minute or delicate plants, or for those that show a tendency to fall in pieces while drying.

Fruits, seeds, bulbs, sections of wood, barks, gums, malformations, etc., if detached from the plant, should be accompanied by or labelled similarly to a branch (if possible with flowers) of the plant bearing them, and they should be wrapped in paper or placed in calico bags when dry.

Each specimen and bundle of specimens should be labelled from the first, especially when travelling, with the place and date of collection; and any remarks on their mode of growth, prevalence, soil, native names, uses, etc., etc., should be written down on the spot if possible.

When the specimens are thoroughly dried, pack them in single layers on sheets of newspaper, make up into a parcel protected by pasteboards on the outside tied on rather firmly, and securely wrap in paper for transmission by post or carrier.

MATERIALS REQUIRED.—Drying paper, usually about 18in. x 11in.; the thick absorbent paper used by grocers does very well, or folded newspapers, cut to the required size. “Spongia” blotting paper is excellent, and stands wear and tear well.

Folded sheets of thin unsized paper for enclosing specimens to be pressed.

Pasteboards, same size as papers, for separating different parcels or protecting delicate from rough specimens.

Pair of outer pressing boards of well seasoned wood, 18½in. x 11½in.

Pair of straps for applying pressure. or stout cord, to be tightened with a rack pin.

Waterproof covering, to be applied under outer boards, only as long as bundle is exposed to wet weather.

HOW TO MAKE A START IN BEE-KEEPING.

BY J. SUTTON, DRAKESBROOK.

The commencing to keep bees is a matter that should first be considered from all the various points. Unless the person interested is prepared to give diligent study to the whole subject, and decides to carry on the work intelligently, and is not afraid of some hard work, he had better leave the matter alone, as at best it is uphill work, and for some time at least, unprofitable and very disappointing.

But having fully decided to become a bee-keeper, then three courses are open:—1st—If a settler, and in possession of a piece of land, the best way, I think, is to find trees containing bees, cut down the tree and remove bees and stores into a hive (referred to later on).

2nd—If there are any bees in the neighbourhood in old box hives, these may be purchased, brought home, and transferred to a hive.

3rd—To purchase a good colony of Italian bees from someone having a good strain, in which case the bees would be already in a modern hive, and at once theory could be put into practice.

If only deciding to keep a few bees for pleasure, and to get honey for home consumption only, it would not matter much which of the three may be adopted, but even in that case Italian bees would certainly be preferable, as they are better able to care for themselves, under whatever circumstances, than the common stock, and in town or city certainly the last would be most satisfactory.

But presuming that the object is to carry on the business for profit, and as an adjunct to general farm work, perhaps to start and get used to operate and handling the bees, the second or gin case swarm would be found satisfactory, as getting one or two swarms in this manner, it would be found of great assistance later on, when the

farmer had located and found a few trees which he intended to cut down and remove the bees.

The best time, all things considered, to commence, is about the month of October, when generally, there is at any season, good or bad, some nectar to be found, and on which the bees can find supplies.

In the case of a settler, there are two reasons which may be assigned for adopting the first method, getting all his bees from trees in his own neighbourhood. First, it will be less costly, and second, it will be removing bees from the trees, which otherwise would be found troublesome later on, should the apiarist decide to keep pure stock, insomuch as black drones flying from the trees would often mate with young queens.

Getting bush bees there is some risk, as the nest will be found in the weakest part of the tree, and being hollow, often breaks at that point, when I have had bees, comb and honey mixed with sand and dirt, rendering the venture almost worthless. Still, even then, a few bees may be obtained, and amidst all the mess, if a colony has already been obtained and removed to the place, the bees will commence to clear up, and store a large quantity of the honey, so after all, the job will give some returns, and one swarm will have been removed. Providing the tree comes down without any damage being done to the nest, except the shaking, then the operation should be as follows :—

First, always try and fall the tree just a little before sundown, leaving time to cut open the nest and removing the stores just before dark, else, if done earlier in the day, while the sun is high, as soon as you have cut open the nest the queen and many of the bees may take wing and settle away up out of reach, and the rest will follow, and after all your trouble you may get the honey and comb and lose the bees.

Having given a few cases in the foregoing, which are not at all exceptional, I will now proceed to give my own experience, and how I have managed to commence, from my first hive until the present time.

I cut down several trees before I got a good swarm and united them together, purchased a good Italian queen, and made myself a little acquainted with the subject. In the meantime I had spotted several trees, and decided to take them as circumstances permitted.

I made a box or hive holding four frames, fastened on the bottom, and made the top to fit so it could be made secure at any moment; with this box and empty frames, made for the purpose, also a long bladed knife, bucket, a towel, a few sheets of old newspapers, a smoker, something in which to place the honey and comb, and a billy of water. These will be found all needed before the job is done. I proceed, having made sure my axe and crosscut saw were already in good order. A good hour's hard graft, sometimes two, and signs of our first contract would be given, as our tree began to crack—at last, with a big crash, down comes the tree. Now, look out for the bees, have the smoker lighted all ready, put on your veil, and, if you are game, make to the hole and give the inmates their first lesson in civili-

sation by a little wholesome smoke. Decide where you will cut out the side of the tree—run the crosscut saw half through in two places, and with an axe and an iron wedge, break off the half, when you will find the hollow completely filled with nice clean comb and honey; a little more smoke, and the knife is brought into requisition, and flake after flake of comb removed, when you come to the part where care must be exercised, viz., a comb having brood in several stages. If eggs are found, look sharp and you may find the queen, and if you can secure her, your task is easy, providing you have with you a small cage in which to put her temporarily until you get out the comb—fix it into the empty frame and place within your small box.

Remove all the comb having brood carefully, and place it on a piece of flat board, first putting on the board some of your old newspaper—cut the comb just to fit your frames—this may have to be done in several pieces, but try and get plenty to fill the frame, the next job is to secure this brood comb, so as you can lift the frame, and hang it into the hive. I generally used several pieces of tape, but a better way would be to have ready a few pieces of deal strips $\frac{1}{2}$ in. x $\frac{1}{4}$ in., half an inch longer than the frame—place one underneath, the other on top, and lash the ends together. Two or three pairs of these may be required to keep the several pieces of comb in place, once it is secure place in the hive, put the queen, if you have found and caged her, on top of this frame. Now you are ready to remove the bees from the trees, which you should find gathering together in a cluster, scoop them up carefully and place them on top of the cage, place an old bag over the lot, and you have them only to remove such of the comb and honey as you may decide. Leave the bees to do the rest, which they will commence to do, and not stop until all available honey is placed in the hive.

But, in case you do not find the queen, proceed as stated above, fix in your brood and wait till dusk, when your bees will be all clustered in one mass within their old abode, in the centre of which should be the queen. Take a ladle or some handy scoop, and lift them all you can, and place them within your box, putting the box handy to the cluster if you can manage it. Wait a few minutes, and if the queen is in, you will observe the remaining bees following and quietly entering the hive.

You must be on the job early next morning before the sun is too high to see how your new venture has succeeded, and if they are working alright, just leave them as they are, presuming, of course, they are secure, and let them gather all the spilled honey they can, after which, some evening, just at dusk, close the entrance, and carefully remove the box and place on the stand you wish them to occupy. But again, on your visit next morning, you may find all your bees have left your hive, only a few remaining of the brood. This will not often happen, but in some cases it certainly will, and the only step is to carefully place them back again within the hive, when, if the queen is with them, they will go to work and give no further trouble.

AN OBJECTIONABLE GRASS NEW TO THE COLONY.

BY THE GOVERNMENT BOTANIST.

A sample of a grass, apparently new to this colony, was lately received at the Department of Agriculture, from Mr. G. Julius Brockman, of Minilya, who gives it a very bad character, on account of its burrs, which adhere closely to the wool of the sheep, and consequently reduce the value of the fleece very materially. It is the *Lappago* (or *Tragus*) *racemosa*, a grass distinguished by the presence on the largest of its glumes—(the chaff, which is smooth in most grasses)—of rows of little hooked bristles, fitting it to cling firmly to wool, thereby deteriorating its value, and at the same time securing the dissemination of the plant in other districts to which the sheep may be transferred.

The grass was first seen by Mr. Brockman in 1886 or 1887, when he noticed a few plants growing near a camping place on the main road, and since that time, each favourable season has been the means of its thriving and spreading, till during the present year, when the copious rains have caused an abundant and luxurious growth on the lighter lands. In the Eastern colonies it does not seem to have given any trouble to wool growers, and has even been recommended as a useful grass to sow on light and poor soils, where the natural forage is deficient.

The "small burr-grass," as the *Lappago* is called, grows only to the height of 1 ft., and being small and weak may probably be brushed against by sheep walking through it without the burrs being picked up by the fleece; but if a sheep lies down and rolls about amongst a dense growth of the grass, the wool would be sure to entangle the burrs, and thereby suffer a loss in value. It may be that in the other colonies the small burr-grass does not usually grow so luxuriantly as on this side, so that its objectionable character of being injurious to the fleece may for that reason not have become very prominent there; still, it must be admitted, the burr has sufficient capacity for doing harm to the wool. Were it not for the burrs the grass would be of value as a forage plant for light or poor soils; and, keeping in view the experience of the Eastern colonies—where, though indigenous, it has not during a long period given rise to much complaint—it may be possible to secure the benefit of its presence on the poor land, while at the same time depriving it of its noxious burrs, namely, by putting sheep on to eat the grass down as soon as it springs up, till drought puts a stop to its growth for one season at least.

It should be said that *Lappago racemosa* is a native of all the Australian colonies except Western Australia, and is absent from the native flora of Tasmania and New Zealand also, though put down as indigenous in all the great divisions of the globe.



LAPPAGO RACEMOSA (Small Burr Grass).

A. Spike-like panicle of flowers. B. Part of panicle enlarged. C. Pair of spikelets opened out, displaying "burr."

BEES.

BY A. CRAWFORD.

WHY BEES SHOULD BE KEPT.

There are very many reasons why bees should be kept, not only on farms, but in townships and suburbs, and even in the cities themselves.

1. One is because all around there is a very large quantity of good, wholesome food every year going to waste that can be obtained at very little expense and scarcely any trouble, and although your stock may roam at its own sweet will, caring nothing about wire netting or barb wire fences, there is no fear of them being impounded, or their owner hauled up before the court for trespass. Nor is it necessary for the proprietor to take up a conditional purchase, or rent a grazing area, at least, in his early attempts to master the practical parts of successful bee-keeping. After he, or she, has tried their prentice hand at it for a season or two they might do worse than apply for a homestead block in some good district and lay themselves out for making a business of what before was a pastime and a pleasure only. Honey is one of those agricultural products that can be put on the market as soon as the crop comes in, or if desired, held over without deterioration. It is also one of those useful products that, when we have a supply equal to, and exceeding the demand, we can export, and if of prime quality, get a fair price for. The returns are not confined to honey only, for there is the wax, for which there is always a good demand, and for which good prices are generally to be obtained.

2. Honey is one of the most useful articles of food we have, it keeps the blood in good order, the bowels regular, and is an almost certain cure for constipation, is useful in many of the diseases that children are heir to, both for inward and outward application; in olden days it was looked upon as a panacea for nearly all ills, but as we got better educated we thought it was far too simple and cheap a remedy and had not a sufficiently learned name, and so for a disease with a poly-syllabic name we have to take a medicine with an equally high sounding title. Happily we are getting more sense now, and many of us are not ashamed to go back to the simple herbal remedies our grandmothers and "wise women" used, and reared our fathers and our mothers so successfully upon, and the more ancient among us can look back to the children contemporary with our younger days, and remember how strong they were and hardy, compared with those we see about us now. Nor is this change confined to the laymen only, in many cases doctors and physicians are reverting to the use of the so-called "simpers," and with the best results, and among them honey is coming more into use at the present time than for many years past.

3. This being so, why should not the keeping of bees become almost universal? How sweet! what a pleasant flavour! the fresh honey, newly taken from the hive has, compared with that you get in tins or glass jars from the storekeeper; the remark is often made "if I could only get honey like this to buy I would never be without it" by some friend who has eaten some section honey fresh from the hive.

Honey ought to be a daily article of food, and if you live in the suburbs or the country, why pay a big price for it when you can have it in your garden and be sure that it is not adulterated with glucose or other abomination. There is no reason at all, the first cost of a proper hive of bees and all appliances complete for working and manipulating the bees would not exceed a couple of pounds, and probably less. That same amount of money would only purchase for you about 32 pounds of section honey at the stores, less than six months supply for an ordinary sized family. Bees have stings you say; quite so, but bees can be handled and worked, if gone about in a proper manner, until you are apt to forget that they are provided with these weapons of defence. Bees, although fussy little bodies themselves, and always in a hurry, do not like fussiness and too much activity in those who are working with them, and when you go to a hive to examine it a curious bee comes buzzing round to return the compliment, it does not believe in being struck at and knocked down; when it finds it has an aggressor of this kind to deal with, its temper, not the best at any time, gets the better of its discretion, and instead of merely flying around to make investigations, it goes for the intruder at once. There is no mistaking a bee once it has made up its mind to sting, there is no hesitancy about it, then one quick, straight, rush is made, and if not knocked down and disabled there and then, the pain is felt even if not seen. Unless annoyed, bees will rarely sting, but there is a great difference in bees, some are so gentle that, without the use of a smoker, the hives can be opened up and the frames of honey taken out, while others require a good deal of smoke to quiet them. The pure Italian bees, as a rule, are very quiet, and can be handled and worked even by children, with little danger of being stung.

4. Bee-keeping affords interesting and profitable work for boys and girls. A hive given to a boy or girl, if they have any taste for animals, will be a source of great enjoyment and profit. They can sell their produce either to their parents or to the storekeepers, and it will teach them to be industrious and provide them with some pocket money that, having earned themselves, they will appreciate and value far more than if it had been given to them. If their tastes lie in this direction it will provide them with a hobby and an interest that may be the means of keeping them out of evil and away from evil companions. Why is it so many boys, and girls too, are so anxious to get away from home? Because their home life is not made as pleasant for them as it ought to be, their tastes are not considered, and no encouragement is given to them to take up hobbies of any kind that would interest and amuse them. Instead of wanting to get away from it, the home ought to be the centre of attraction. All and many will not take to bee-keeping, but those who have a

taste in that direction by all means encourage it, no one who has not tried it can imagine the amount of real, down-right pleasure that can be obtained by studying the various operations of a hive of bees. It is like a fairy story being acted in reality, something new, something unexpected, something interesting continually cropping up, affording work for the hands and plenty of work for the brain. The pleasure need not be confined to boys, girls can enjoy and appreciate it quite as much, and many a poor woman to-day has reason to bless the person who first taught her how to manage bees, as, were it not for bees, she would not know how to make a livelihood. Some of the most successful bee-keepers are women. The work suits them, it is interesting, it is not heavy, and it is as profitable as it is pleasant.

5. Fruit growers ought to keep bees because most of the fruit trees require to have their flowers artificially fertilized and this is generally done by bees. Wherever there are not plenty of bees about an orchard a heavy crop of fruit need not be expected, and the more bees there are about the heavier the crop that may be expected, other things being equal. Some years ago in one of the districts in California the fruit growers took it into their heads that the bees destroyed the ripe fruit, cutting the skin to get at the sweet juice, and all the bees in the district were abolished or destroyed, but after two years of almost entire failure of crops they were glad to get them back again. It is a mistake to think that bees cut the skin of ripe fruit, their mandibles are not capable of doing so. Bees are frequently seen sucking the juice from ripe fruit from holes in it, but it is not the bee that has made the hole, that has been done by some other insect, probably a hornet, and the bees only take advantage of the incision already made. Every orchardist should have a number of bees in his orchard according to its size.

Although bee-keeping is profitable, interesting, and simple, to be any of the three it must be done on proper lines, and the would be bee-keeper should get a simple book on the subject, and study it carefully before starting to do anything with the bees; and better still if a friend who has had some practical knowledge of the subject can be induced to come and give a practical lesson or two. More will be gained by watching him than the reading of many books. A few practical lessons given first will make all the book lore plain, which in many cases would have been as Greek without them. The appliances required for working on a small scale are a swarm of bees, pure Italians for preference, they cost a little more to start with but they are quiet to work, good workers, and defend their hives well from ants, wax moths and other intruders.

A bar framed hive; neither pleasure nor profit can be expected from keeping bees in a kerosene case or other box that cannot be opened up and examined at will. A second story with frame or a half story for sections.

A bee-veil, a smoker, and a number of spare frames or sections, according to which it is intended to produce, section honey or ordinary comb honey.

With the above appliances a good start can be made. There is one thing to remember, that if the bees are kept in a dry district where natural water is not available close to the bees, it must be provided for them. Bees are fond of brackish water. A very thin board should be left floating in the water so that the bees can alight on it and drink without danger of being drowned. Bee-keeping for the sake of getting a supply of honey is simple, but if anyone wishes to embark on a sea of exploration into the unknown, the study of bees will afford time and opportunity, for with all the study and the results that have been written on the subject, some of the habits of bees are as yet unsolved problems. Bee-keepers starting only require a very simple book; later on, when the rudiments are mastered, other and more scientific works can be gone into if desired, and original research engaged in.

NATIONAL SHOW OF PRODUCE.

TO BE HELD IN CONNECTION WITH ANNUAL PRODUCERS' CONFERENCE, APRIL 16TH, 1901.

IN order to show the great progress made in Agriculture during recent years, it has been decided by the Hon. Minister for Lands to hold a National Show in Perth next April, in connection with the Annual Producers' Conference. Prizes are to be given for the best collections of farm produce, exhibited by groups of Agricultural Societies, and also for the best exhibits of manufactured articles made from locally grown products.

1. CHAMPION PRIZE.

(DISTRICT EXHIBIT.)

Best collection of Farm, Garden and Orchard produce, comprising everything grown, produced and made on a farm. First prize, £30; second prize, £15; third prize, £10.

The exhibit to be collected by the Agricultural Societies from produce grown within the boundaries of their respective districts, as defined by the Department of Agriculture, and to be displayed by them. Should they be called upon to do so by the Judges, the Secretaries of the Societies, or the person placed in charge of the exhibits, shall make a declaration that all the exhibits have been grown or produced within their respective districts.

In order to encourage individuals to contribute to the district collection, bronze medals, and second and third class certificates of merit will be issued by the Department for the best exhibits in each class. For this purpose the exhibits in the district collections may be labelled with the name (or number) of the grower.

The medals and certificates will be given for the best exhibits in each class, irrespective of the district, such as the best pumpkins, best sample of wheat, etc., and need not necessarily be contained in the best district collection.

The prize money will be paid by the Department to whoever the Societies nominate to receive it, but this nomination must be sent in to the Secretary, with the detailed entries, not later than March 15th.

The medals and certificates will be distributed per medium of the Agricultural Societies.

MANUFACTURED GOODS.

EDIBLE.

2. Best collection of edible articles manufactured from produce of West Australian soil. First prize, gold medal; second prize, silver medal; third prize, bronze medal.

NON-EDIBLE.

3. Best collection of non-edible articles manufactured from produce of West Australian soil (minerals excluded). First prize, gold medal; second prize, silver medal; third prize, bronze medal.

POULTRY APPLIANCES.

4. Best collection of Poultry-keeping appliances. First prize, bronze medal; second prize, certificate; third prize, certificate.

BEE APPLIANCES.

5. Best collection of Bee-keeping appliances. First prize, bronze medal; second prize, certificate; third prize, certificate.

SPRAYING APPARATUS.

6. Best collection of Spraying apparatus. First prize, bronze medal; second prize, certificate; third prize, certificate.

MANURES.

7. Best collection of Manures, to be in stoppered bottles, to contain about 7 lbs. each, with analysis attached. First prize, bronze medal; second prize, certificate; third prize, certificate.

The articles to be manufactured by the exhibitor or through the agency of the firms competing. First, second and third-class certificates will be issued for the best articles of each class in the exhibition, not necessarily contained in the winning collection. Should they be required to do so by the Judges, the exhibitor, or in the case of a firm, the manager, shall make a declaration that all the articles have been made by himself, or his firm, from agricultural produce raised in West Australia.

BOTANICAL.

POISON PLANTS.

8. Best collection of West Australian Poison Plants. (Pressed.) First prize, bronze medal; second prize, certificate; third prize, certificate.

NATIVE GRASSES.

9. Best collection of native Grasses. (Pressed.) First prize, bronze medal; second prize, certificate.

SALTBUSHES.

10. Best collection of native Saltbushes. (Pressed.) First prize, bronze medal; second prize, certificate.

FODDER PLANTS.

11. Best collection of native fodder plants, not including grasses. (Pressed.) First prize, bronze medal; second prize, certificate.

WOOL.

12. Best collection of locally grown Wool in fleece. First prize, gold medal; second prize, silver medal; third prize, bronze medal.

All railway freights and carting expenses from railway to exhibition hall will be defrayed by the Department, on all produce sent by the Agricultural Societies for competition. All table and necessary accommodation will be provided free of charge, but all exhibits must be displayed by the competitors at their own expense in the space allotted for that purpose by the Department. It is suggested that the delegates elected for the conference might be entrusted with this work.

To encourage country societies to make a good exhibit of perishable produce, a certain space in the Government Refrigerating stores will be set apart for the purpose of keeping perishable products, and on each district notifying their intention of competing, a reasonable amount of exhibits will be stored for them *free of charge*. The Secretary, Department of Agriculture, reserving the right of limiting or rejecting any exhibit which, in his opinion, may not be worth the expense of cold storage.

Societies will be allowed to exhibit a reasonable number of bags of grain, and can collect from the farmers in their district, but will be limited to one bag from each farmer of each class of grain.

All Societies intending to exhibit must notify the Secretary, Department of Agriculture, by November 1st, as to their intention to exhibit, so as to enable arrangements to be made for a hall, and all entries in detail must be in the hands of the Secretary by March 15th, 1901.

The decision of the Judge or Judges in each case to be final.

The Secretary, Department of Agriculture, reserves the right of rejecting any exhibit not considered suitable.

For the purposes of the competition for the Champion prize for different districts, the Colony has been divided into 14 districts, and the societies within each district should combine together and make one large exhibit. Each exhibit will be placarded Blackwood, Beverley, Northam, etc., as the case may be. A list of the Societies in each district is appended.

Efforts will be made to arrange excursion trains from the country, so that all may see the exhibition.

A sale of produce will be arranged by the Government auctioneer after the exhibition, and anyone desiring to sell their exhibit may do so, by paying the auctioneer's commission.

The co-operation of all societies is invited so as to make a good show, and thereby to stimulate the demand for West Australian produce.

Any further particulars will be supplied on application to the Secretary, Department of Agriculture.

LIST OF EXHIBITS WHICH IT IS SUGGESTED MIGHT BE COLLECTED
BY THE SOCIETIES COMPETING FOR THE CHAMPION PRIZE:—

COLLECTION OF GRAINS.—Wheat, Oats, Barley, Rye, Maize, etc.

COLLECTION OF ALL KINDS OF SEEDS.

Beans and Peas, Cow Pea, etc., both as green feed, hay and seed.

Rock, Preserving, and Water Melons, Pumpkins, Marrows, Squashes, Cucumbers, etc.

ROOT CROPS.—Sugar Beets, Turnips, Swedes, Kohal Rabi, Mangels, Potatoes, Sweet Potatoes, Yams.

HAY AND CHAFF.—Lucerne, Wheaten, Oaten, Millet, Grass, Mixed, both bale and sheaf.

ENSILAGE.—Sweet and sour, chaffed and whole.

FODDER.—Sorghums, Millets, Lucerne, Green Maize, Teocinte, Tree Lucerne, Lupins, Cabbage, Kale, Rape, Mustard.

MISCELLANEOUS CROPS.—Buckwheat, Ramie, Jute, Broom Millet, Peanuts, Arrowroot, Indigo, Sunflower, Cassava, Tumeric, Tobacco, etc., etc.

VEGETABLES.—Cabbage, Beans, Peas, Tomatoes, Asparagus, Cauliflower, Chilies, Leeks, Parsnips, Carrots, Rhubarb, Turnips, etc.

FRUIT AND GRAPES of all kinds, both fresh, dried and preserved.

Honey, Eggs, Butter, Cheese, Bacon, Lard.

HOME MADE Jams, Jellies, Pickles, Vinegar, Wine, Bottled Fruits, Sauces, Arrowroot, Millet Brooms, Fibre, Tobacco, Candied Peel.

LIST OF EXHIBITS WHICH IT IS SUGGESTED MIGHT BE COLLECTED
BY FIRMS COMPETING FOR THE PRIZE FOR EDIBLE PRODUCTS:—

Collection of Jams, Jellies, Sauces, bottled; tined and dried Fruits, Vinegar, Candied Peel, Wines, Arrowroot, Tapioca, Butter, Cheese, Bacon, Ham, Lard, Honey, Wax, Bread, Maize Meal, Oatmeal.

LIST OF EXHIBITS WHICH IT IS SUGGESTED MIGHT BE COLLECTED BY
FIRMS COMPETING FOR THE PRIZE FOR NON-EDIBLE PRODUCTS:—

Collection of articles made from local Timbers, Handles for Tools, etc., Brooms and Brushes made from Millet and Fibres, collection of Fibres, Gums, Resins, Tobacco, Dyes, Oils, Leather, Wool, Basil, Cotton.

For the purpose of the Exhibition, Societies are divided into districts as follows:—

BLACKWOOD.

Balingup Farmers' Association.
Lower Blackwood Farmers' and Graziers' Association.
Nelson Agricultural Society.
Nelson Branch Bureau.
Upper Blackwood Agricultural Society.

FREMANTLE.

Coogee Agricultural and Horticultural Society.
Jandakot Agricultural Society.
Walliabup Progress and Horticultural Society.

MURRAY.

Drakesbrook Agricultural Association.
Harvey Farmers' Club.
Harvey Agricultural Alliance.
Murray Horticultural Society.
Murray District Farmers' and Fruitgrowers' Co-operative Assn.
South Murray Farmers' Association.
Waigerup Agricultural Hall Association.
Waroona Agricultural and Progress Association.
West Coolup Agricultural Society.
West Coolup Branch Bureau.
Kelmscott Horticultural and Agricultural Society

PLANTAGENET.

Albany and King's River Settlers' Association.
Albany Agricultural and Horticultural Society
Albany and District Settlers' Association.
Mt. Barker District Settlers' Association.

ESPERANCE.

Esperance Agricultural and Horticultural Society.

SUSSEX.

Busselton Branch Bureau.
Newtown Farmers' Progress Association.
Quindalup Progress Association.
Southern Districts Agricultural Society.
Wonnerup Progress Association.

SWAN.

Darling Range Vine and Fruitgrowers' Association
Helena Vine and Fruitgrowers' Association.
Swan Districts Vine and Fruitgrowers' Association.

TOODYAY.

Deepdale Farmers' and Fruitgrowers' Association.
Moora Farmers' and Progress Association.
Newcastle Branch Bureau.
Toodyay Agricultural Society.
Toodyay Vine and Fruitgrowers' Association.
Victoria Plains Farmers' Association.

NORTHAM.

Goomalling Farmers' Club.
 Irishtown Farmers' Club.
 Irishtown Branch Bureau.
 Jennapullen Agricultural Society.
 Jurakine Agricultural Association.
 Mombekine Agricultural Society.
 Northam Agricultural Society.
 Wongamine Farmers' Club.
 Meckering Agricultural Society.

VICTORIA.

Greenough Farmers' Club.
 Greenough Farmers' Association.
 Geraldton Agricultural and Horticultural Society.
 Irwin Agricultural Society.
 Northampton Farmers' Association.

WELLINGTON.

Brunswick Farmers' Club.
 Boyanup Farmers' and Progress Association.
 Cookernup Farmers' Progress Association.
 Donnybrook Progress Association.
 Ferguson Farmers' Association.
 Preston Progress Association.
 Thomson's Brook Progress Association.
 Wellington Pastoral and Agricultural Society.
 Wellington Vine and Fruitgrowers' Association.
 Waterloo Farmers' Protection Association.

WILLIAMS.

Kojonup Agricultural and Horticultural Society.
 Wandering-Hotham Branch Bureau.
 Wandering District Agricultural Society.
 Williams Branch Bureau.
 Williams Agricultural Society.

GREAT SOUTHERN RAILWAY.

Great Southern Pastoral and Agricultural Society.
 Katanning Farmers' Association.
 Katanning Branch Bureau.
 Narrogin Agricultural Alliance.
 Wagin Farmers' Alliance.
 Wagin Branch Bureau.

YORK.

Greenhills Progress Association.
 Greenhills Branch Bureau.
 York Agricultural Society.
 York Branch Bureau.

BEVERLEY.

Beverley Agricultural Society.
 Beverley Branch Bureau.
 East Beverley Farmers' Association.
 Pingelly Agricultural Society.

EXPERIMENTAL WORK, 1899-1900.

BY HUGH PYE (PRINCIPAL DOOKIE AGRICULTURAL COLLEGE).

Those who have done much experimental work quickly come to the conclusion that the yields of grain are, as a rule, proportional to the thoroughness of the methods of the cultivation adopted.

Thus, where the experiments are small and are thoroughly within the grasp of the individual, the relative yields are high—in fact, exceedingly high sometimes—and, to some extent, are misleading to the farmer, who will not see in the experiment the principle which gives the warrant for carrying out larger experiments. Perhaps, too, the sanguine experimenter impresses the novice to such an extent that it is thought that all that has to be done is to buy the much-talked of variety of grain, drill it in with a certain amount of manure, and, at the harvest, fill from 10 to 15 bags of wheat to the acre. Now, the more experienced farmer would not be so sanguine, although he may appreciate the spirit of the experiment. He would not rely so much on the variety of the wheat as on the amount of labour involved, the method of directing it, and, lastly, what the total cost compared with the probable net return would be. Then we have the man who owns land, and who thinks that there is nothing under the sun in the farming line that he does not understand. He does not take an agricultural paper, and so keep up-to-date; he tells you that manures exhaust the land; but, in the same breath, when you tell him that five to six bags of wheat per acre were taken off an old cultivation paddock, he says—"Oh, yes! but you used manures;" yet, with this convincing fact before him he still may not appreciate it, but remain true to his ignorance or want of faith in his own judgment. There is, again, the farmer who tries the experiment and fails, although he has faith in it. There must be some cause for this failure if the experiment has proved a success elsewhere. Where does the failure lie? That is the next question, and here the farmer is often lost; and here it is that the good work of the experimental stations, that are likely to be established over our fertile country, will come to his rescue; and, as time goes on, no doubt, the system will be extended to the carrying out of feeding experiments with stock, both in respect to the production of dairy produce and of meat. I am convinced that the object lessons seen at an experimental station will do more good towards carrying conviction to the farmer of the most suitable methods to be adopted for his conditions than anything else, and they will form a theme for discussion at the meetings of the district agricultural societies, which will be far more beneficial to the farming community than, as at present, devoting so much time to drawing up and altering the annual prize-list.

Some wheat-growers put too much faith in the variety of wheat sown, and not sufficient faith in thorough cultivation. Though, no doubt, certain varieties may be more suitable than others for certain districts, still the fact remains that the yields at harvest-time, other conditions being equal, are proportional to the thoroughness of the methods of cultivation adopted, for, although unforeseen troubles may

arise, such as late frosts, boisterous winds, caterpillars, &c., still, if we extend our observations over a series of seasons, the principle of the thoroughness of cultivation stands paramount.

It would be interesting to the wheat-growing world if the weight per bushel of wheat and other cereals was recorded every year at all the principal agricultural centres, as this, with other data, would most likely be of considerable value.

In reference to the effects of manure in the production of grain, there is still scope for much experiment. There are some misconceptions that a good number of farmers have yet to overcome in reference to the manuring of soils; but these are fast disappearing, owing to the research of scientific experimenters, often aided by the experience of thoughtful agriculturists.

In the past I have pointed out that fields manured with phosphatic manures invariably gave good returns in the Northern districts, and that light dressings were more economical to use than heavy dressings; but I am not prepared to state that exceedingly light dressings will give consistently the most economical returns when tried over large areas, unless the manure be in a highly concentrated form; for, owing to the want of moisture in the soil, the beneficial effects of the manure can scarcely be said to be felt, which is especially noticeable during dry seasons in late sown crops not sown on fallow ground.

The advantages of using concentrated manures or fertilisers may be summarised thus:—they are, as a rule, reliable; they have the plant food in an available and very soluble form; the percentage present is very constant and so facilitates the gauging of results; small quantities have far reaching effects; and freightage is comparatively less than that of ordinary manures.

The chief disadvantages of using concentrated manures are:—The apparently high cost, and the fact that the drills at present made will not distribute, evenly and consistently, very light dressings without considerable caution being taken, which entails extra labour in watching the manure-runs. Damp weather usually affects them, making them difficult to distribute, owing to their absorption of moisture; extra labour must be used to mix with other matter to give bulk where drills are not expressly made for distributing light dressings of concentrated manure; also extra labour is required in screening the mixture, and extra cost is incurred in the purchase of screens.

The advantages of the less concentrated fertilisers lie in their apparent cheapness. Thus they foster an industry so essential to farmers, and bring the factor of competition with imported fertilisers into play, which tend to lower prices. The manures are as reliable as the certificates state; are in a form ready to be applied; give yields on the whole as good as those obtained from the use of concentrated manures, when applied in quantities of equal money values; do not require so much skill in applying, are more readily obtained.

The disadvantages mainly lie in the extra freight; in the greater variation in quality from year to year, possibly from want of appreciation of detail; and in the difficulty of obtaining supplies of the raw material.

The quantity of manure a farmer may apply to the soil and get good financial returns from his crop, depends on the rainfall, on the methods of cultivation adopted, both in preparing the land for the seed and the after treatment, and on the selection of suitable varieties of seed. The more generously the land is treated, the better will it respond to the application of manures suitable to it. Manure may easily be wasted by applying heavy dressings, and even by applying lighter ones to badly prepared seed-beds, where, owing to the inefficient conservation of moisture, through shallow and irregular ploughing, the crop is more subject to the variations of the weather. Unless a soil is in good heart, and not charged with weed seeds, it cannot be expected to give excellent returns. Manures can only give good results when the condition of the soil is such that those chemical and other changes so necessary for the existence of plants can go on in the soil without interruption. It cannot be expected that manuring is a talisman that will act when the methods of cultivation adopted are slovenly; in fact, it necessitates a more advanced system of cultivation, hence the introduction of the seed-drill and horse-hoe.

It takes more moisture in poor soils to obtain a unit of plant tissue than in rich soils. However, in the latter soils, during the more favourable period of growth, there is a tendency of rankness, and as soon as the first hot wind blows, or if there be a long period of dry weather, the strain on the crop is very noticeable. To confine the stooling of the crop, it is better to give a heavier seeding, as there will not be so much strain on the individual plant.

About three-quarters of a bushel of wheat per acre is sufficient in most cases. Where the seed is small, less is sometimes used. If the season has every indication of being a moist one, the seeding may be as low as a half-bushel, if sown early, especially if the grain is small



DEPARTMENT OF AGRICULTURE.

GOVERNMENT REFRIGERATING WORKS.

RULES AND REGULATIONS FOR GENERAL INFORMATION.

NOTE.—The following Rules and Regulations are framed to protect the consignments of persons using these Stores, and the co-operation of owners of goods is solicited, in order that they may be strictly observed.

1. The Government will exercise all reasonable precautions to avoid loss or damage to goods, but will not hold itself responsible for any loss or damage from any cause whatsoever not attributable to the wilful neglect of its officers.
2. No goods will be received which, in the opinion of the Manager, are not in good order, and any consignment found to have become objectionable must be removed from the Stores by the owner, on receipt of a written notice to that effect.
3. Lessees will transfer their consignments to and from the Stores, and will also be required to advise the Manager in writing 48 hours previous to the arrival of consignments.

4. Stores will be let on lease for fixed periods, at fixed rentals, prepaid at the office of the Government Refrigerating Works on the day on which they become due.

5. Lease forms require to be signed, and the rents paid, previous to the stores being used; and a seven days' notice in writing must be given to the Manager if Lessee intends occupation of space after the expiration of term arranged.

6. Lessees must not sub-let their space and must only store goods of which they are the sole proprietors, in the space rented by them. Any attempt to defeat this condition will render the Lessee liable to forfeiture of his space and any rent which may have been paid.

7. Firms storing goods will be responsible for all charges till the goods are removed from the Stores; and goods will only be delivered on a written order from the owner, and no transfers can be made.

8. Access to the Stores can only be had during authorised hours, and persons using the Stores must strictly observe all the Rules and Regulations now in force, or which may be made from time to time for the proper management thereof.

9. Consignments from the country and seaports should reach the Works in the early morning, if possible, but will be received at any hour during which the Works are open.

10. Consignors should arrange with the Railway Department to place their consignments in the Government Refrigerating Siding, in no case later than 4 p.m.

11. Consignments must be securely packed, properly branded and addressed, and sent (freight prepaid) c/o Manager, Government Refrigerating Works Siding, Perth. An advice note should be sent by post, giving the name and address of the sender, with full particulars of each consignment.

12. Receipts must be given for any goods transferred to or from the works, except in the case of Lessees, when receipts will be dispensed with. A written order must, however, be produced before admission to the Stores can be obtained.

13. The Stores on no account will be opened at any hours but those specified.

PUBLIC HOLIDAYS.

14. The Manager will arrange special hours for public holidays.

BUTCHERS' STORES.

15. The hours and regulations governing butchers' stores will be as follows:—

HOURS.—Opened at 5 a.m. Closed at 6 a.m. Opened at 8 a.m. and closed at 6.15 p.m. Except on Saturdays.

HOURS ON SATURDAYS.—Opened at 5 a.m. Closed at 6 a.m. Opened at 8 a.m. Closed at noon. Opened at 3.30 p.m. Closed at 4.30 p.m. Opened at 10 p.m. Closed at 11 p.m. (for receiving only).

REGULATIONS GOVERNING BUTCHERS' STORES.

16. Meat must be suspended from the hangers, and will not be allowed to be placed on the floor.

17. Lessees will be charged with the rent for the period for which the lease is signed, and until the key is returned to the Manager, whether the space is used by them or not.

18. A deposit of 2s. 6d. will be taken for each key, and refunded when the lease expires and the key is returned.

19. Lessees will be held responsible for any loss or damage to Government property.

FISH STORES.

20. The hours and regulations for Lessees of fish stores are the same as those for Lessees of butchers' stores.

21. Fish not stored under lease will be subject to restricted hours, as may be found necessary from time to time.

MILK STORES.

22. Suitable arrangements may be made for the storage of milk, on application to the Manager at the Works.

BUTTER STORES.

23. The hours and regulations governing butter stores will be as follows:—

Opened at 8.30 a.m. Closed at 5 p.m. Except on Saturdays, when they will be opened at 8.30 a.m. Closed at 11.45 a.m. Opened at 3.30 p.m. Closed at 4.30 p.m.

24. Butter will be charged at the rate of 3d. per box per week, or portion of week, pre-paid.

SPECIAL REGULATIONS.

25. No delivery will be given unless on the written order of the owner, and all charges due by the owner are paid.

26. No transfer of ownership can be given. Butter must remain in the name of the person who puts it in the Store.

POULTRY AND GAME STORES.

27. The hours and regulations for Lessees are the same as for Lessees in the butchers' stores.

SPECIAL REGULATIONS.

28. No hares in bags will be received.

29. No transfer of ownership will be allowed. Delivery will not be given until all charges due by the owner are paid, and then only on his written order.

ICE STORE.

30. The hours and regulations governing the Ice Store will be as follows:—

Opened at 5 a.m. Closed at 6 a.m. Opened at 9 a.m. and closed at 5.30 p.m.

31. Ice will be sold in, nominally, 200lb. blocks, at 10s. per block, *ex store*.

SUGGESTIONS TO CUSTOMERS.

The following suggestions are recommended to the notice of persons using the Stores:—

All packages should be securely fastened, uniform in size, legibly branded, and always clean.

The following sizes are recommended:—

Butter Boxes.—Inside measurements, 12 x 12 x 12 inches.

Cheese Cases.—Inside measurements, length, 22½ in.; diameter, 13 in.; ends, 1 in. thick; centre board, ½ in. thick.

Apple Cases.—Inside measurements, 26½ x 12 x 8 inches, and 26½ x 9 x 10½ inches, with the ½ in. partition in centre.

Orange Cases.—Inside measurement, 26½ x 12 x 8 inches, with ½ in. partition in centre; top and bottom solid; sides partly open, with ½ in. battens across each end on top.

Egg Cases.—Patent packers, with fillers, require no packing, hold 36 dozen; 34 x 22 x 10 inches, partly open, hold 60 dozen; casks hold 100 dozen.

Poultry Crates.—29 x 24 x 6 inches; solid top and bottom; ends and sides partly open.

Turkey Crates.—29 x 24 x 8 inches; same as above.

Rabbit Crates.—30 x 22½ x 7 inches; partly open at sides and end.

For further information as to space available, rents and charges, apply to

The Manager,

Government Refrigerating Works,

Wellington Street, Perth.

L. LINDLEY COWEN,

Secretary Department of Agriculture.

26th July, 1900.

CROPS TO SOW IN SEPTEMBER.

PERCY G. WICKEN.

BEANS. It is rather late to sow Broad beans, but all varieties of French and Runner beans may now be safely sown. It is not a good plan to sow too many at once, but sow a row or so every fortnight, so as to have a succession coming on during the Summer. For dwarf varieties plant in drills, 30 inches apart, and 12 inches apart in the rows.

BEET. Sowings of red and silver beet may be made, also thin out and weed beds previously sown.

CABBAGE. Seed of the Drumhead varieties might still be sown in the Southern districts, but it is late for other parts, keep the beds clean, plant out any that have missed, and if necessary, give beds a dressing of sulphate of ammonia; this should be done just before a shower of rain.

CAPE GOOSEBERRY. Seeds may now be sown in beds in the open, ready for transplanting later on.

CAPSICUMS. Seeds may now be sown in beds in warm positions.

CUCUMBERS. In warm districts cucumbers may now be sown, after the ground is prepared, hills should be worked up with hoes, they should be dug at least 18 inches deep and the hills should be about a yard across, put about a dozen seeds in each hill and then thin out to about five plants. Mix up a barrow load of stable manure in each hill before sowing the seed. If the nights are cold cover the hills with an old sack or a few bushes and remove in the day time. Keep a lookout for grubs eating the young plants.

ROCK MELONS. These require to be heated the same as cucumbers.

ONIONS. A few may be sown in beds for future use, and those in beds may be planted out.

PEAS. Quick-growing varieties may still be sown in the cooler districts.

POTATOES. If potatoes are not already planted they should be put out at once, the land requires to be well and deeply worked and plenty of good stable manure placed in the drill, they should be planted in drills 30 inches apart and 16 inches apart in the drills, be sure to see that the seed is clean and not scabby before planting.

WATER MELONS AND PUMPKINS may now be planted out, the hills should be well worked and all couch grass or weeds taken out, and either a quantity of stable manure or a little super-phosphate should be worked into each hill, the hills should be at least 12 feet apart each way.

MARROWS should be planted out this month, the bush variety is much the best to grow for garden purposes, as they do not take up so much room, they may be planted out the same as the running varieties, but can be put much closer together, the hills being made 6 feet apart each way.

TOMATOES. Seeds may now be planted in beds in the open, everyone should plant out a few of this wholesome fruit, those who have raised early plants in boxes may now plant out.

The following farm crops should be sown during September. Maize for grain, and also for green feed and ensilage. Sorghum for seed, Hungarian millet, mangolds and sugar beet, potatoes, buckwheat, sunflowers, chicory, and also towards the end of the month, cow peas, lima beans, soy beans, and other leguminous crops. Lucerne can still be sown, but it is advisable to have it sown earlier so that the roots are established before the hot weather sets in. A few rows of arrowroot should be planted, it will come in for pig feed.

ANSWERS TO CORRESPONDENTS.

Mr. W. L. Hoop, York, writes: One of my bronze wing turkeys has contracted a disease as follows: Big lumps all round the beak, and sore scabs on the hackle, and white sores inside the mouth, and under the tongue white lumps like pieces of cheese.—This has been submitted to Mr. A. Crawford, who replies: Shut the bird up in a warm place, free from draughts, and give half a teaspoonful of Epsom salts. Get from a chemist a bottle of the ordinary chlorate of potash and perchloride of iron mixture and a bottle of the following mixture: carbolic acid, 1 drachm; sulphurous acid, 3 drachms; tincture of perchloride of iron, $\frac{1}{2}$ oz.; glycerine, $\frac{1}{2}$ oz.; with a fine brush touch all the parts which show sores, morning and evening. Six hours after giving the Epsom salts begin to give doses of the chlorate of potash mixture (quarter of the amount that is an ordinary dose for an adult human being) twice daily. Feed on soft food mixed with a little brandy and water. Continue until the bird gets well. For prevention, give all the birds some sulphate of iron in their water, $\frac{1}{4}$ oz. to the gallon, use a crockery ware vessel, metal will be destroyed. This also applies to fowls, only the dose should not be quite so large. The complaint is Roup.

Mr. J. D'Alton, Northam, writes: Could you kindly give me information as to a simple means of testing for anthrax, tuberculosis and pleuro-pneumonia?—This letter was submitted to Mr. Weir, Veterinary Surgeon, who replies as follows: The diseases mentioned may be recognised from the following symptoms. *Anthrax*.—Suddenness of attack, swellings on the body, chiefly about the flank, difficulty in breathing, the blood oozing from the nostrils, death generally taking place within 24 hours.—*Tuberculosis*. Unthriftiness, glandular swellings at side or between the jaws, cough, the latter being most noticeable when the animal is made to move rapidly. *Pleuro-pneumonia*.—Victim prefers standing position, back arched, head drooped, characteristic grunt with each expiration, friction sounds will be heard on applying the ear to the chest walls, immediately behind the shoulder. Contacts contracting the disease will reveal its injurious nature.

Mr. A. L. Baker, Quindalup, writes as follows: Will you kindly inform me of the proper method of propagating grape vines from cuttings.—This enquiry was referred to Mr. A. Despiessis, the Viticultural and Horticultural expert, who says: The cuttings should not be either too thick nor too thin, they should be about 14 inches long, short jointed preferably. Before planting bend each joint between the fingers until a crackling sound is heard. Set in nursery rows about $2\frac{1}{2}$ feet apart, and 6 to 8 inches in the rows, bend the cuttings slightly when planting in preference to planting them straight. Leave two eyes only out of the ground; one flush with the ground and the other above. It is better to cut the end in a slightly oblique line away from the bud. Either a sandy loam or a loamy soil is best, moist, but well-drained. Transplant 12 months hence in the early spring; if the cuttings are stained by light, dip them before planting in a whitewash containing a small amount of flower of sulphur, and also sulphur about the end of October.

Mr. J. Whistler, Boyanup, writes: Please inform me the proper time to use the sulphuric acid and sulphate of iron wash on vines.—This was submitted to Mr. A. Despiessis, the Viticultural and Horticultural expert, who says: Now would be the time to dress the vines with the sulphuric acid and sulphate of iron wash as a preventive against anthracnose. The vines should be painted before the scales covering the buds are actually forced asunder by the shoot.

Mr. F. Harris, Knebworth Avenue, Perth, writes: Would you kindly inform me the best sorts of fruits to plant for export trade, soil red, and chocolate loam, with clay subsoil in Darling Ranges.—This was submitted to Mr. A. Despiessis, the Viticultural and Horticultural expert, who says: Apples and oranges are the best fruits to grow for the export trade. Varieties, Apples: Jonathan, Cleopatra, Rome Beauty, Dunn's Seedling, Rokewood, Kentucky Red Streak and Stone Pippin. Oranges: Washington Navel, Mediterranean Sweet and Joppa.

MARKET REPORT.

FOR MONTH ENDING SEPTEMBER 11TH.

The West Australian General Produce Company report sales effected for the following articles on account of various consignees, for the four weeks ending September 11th, 1900:—Sales effected during the past four weeks, considering the continuous wet weather, have been very good, and if we are favoured with a little fine weather, business will greatly improve. Bacon, owing to the reduction in the price of eggs, the sale of this article has materially improved; we have disposed of several large consignments, the quality of which has been perfect. Butter, cable just to hand ex Melbourne indicates a slight rise in values, as anticipated, owing to large orders for the London market. Locally we have disposed of some very choice Victorian butter which has given satisfaction to the trade. Local butter if of good quality finds ready sale. Cheese, moving off fairly well, considering the cool weather. Eggs, local have been coming in very freely, consequently eased somewhat, imported lots also have been very plentiful. Potatoes, imported are arriving in fair quantities, values unaltered. Local potatoes, supplies limited, good samples find good outlet. Seed potatoes selling well. Onions have had a rise in price, and are quoted at £10 to £15 f.o.b. Adelaide. Chaff, market not overstocked, the supply coming forward just meeting the demand. Bran and Pollard easier in price. Hay and Straw, moderate sales. Flour, local is selling well, and is finding great favour with bakers and pastrycooks. Oats has risen in price, owing to heavy shipment for China. Wheat, moderate supply, values unaltered. Oil Cake is finding a good outlet amongst dairymen and others, and is fast becoming a staple food for stock and poultry. Fruit is very scarce, and consignments forward found quick sales, especially oranges, mandarines, cape gooseberries, and bananas. Vegetables have been scarce, but are now coming in more freely. Poultry, if young and fit for table, finds a good outlet. Fat ducks and turkey gobblers find ready sale. Pork is a little easier in price, but there is still a good demand for young pigs from 40 to 70 lbs weight, well butchered. Consigners should endeavour to let us have them not later than Friday nights. Kangaroo, the market has been completely glutted with this meat, and value has fallen, in fact some consignments were regularly given away. Artificial manures moving off a little for potato planting. Farm and Dairy produce.—Bacon, sides, case lots, 9½d to 9½d, smaller quantities 10d to 10½d lb; flitches, case lots, 9d to 9½d, smaller quantities, 9½d lb; hams from 11d, 1s, 1s 1d to 1s 2d lb; butter 1s 1d to 1s 1½d lb; lard, tins 9d, bladders 8d lb; cheese, N. Z., case lots, 9½d, medium, case lots, 8½d to 9d; eggs, local, 1s 1d to 1s 3d doz; potatoes, imported, £6 5s to £7 ton, local, £7 15s to £8 10s ton, seed, £7 10s, £8 to £9 ton; onions, £13 ton; chaff, £7 to £8 ton; hay and straw, worth £4 10s to £5 ton; bran, £6 10s to £6 15s. ton; pollard, £6 12s to £7 ton; flour, local sacks, £9 5s to £9 10s; quarters, £9 15s to £10; oats, N. Z., 3s 2d to 3s 6d; maize, feed, 5s, seed, 6s 6d to 8s bushel; wheat, 4s 3d, 4s 6d to 4s 9d bushel; oil cake, £6 17s 6d to £7 ton; peas, dry, from 5s 6d to 9s bushel. Fruit.—Oranges, local, from 7s, 10s, 14s, and up to 16s case; lemons, local, from 6s 6d, 8s, to 10s case; mandarines, local, from 25s, 30s to 40s case; citronelles, worthless; loquats, from 4d, 5d, to 6d lb; bananas, worth 20s to 30s case; passion fruit, worth 16s, 18s 6d to 21s case; cape gooseberries, 4d to 4½d lb. Vegetables.—Cabbage, from 8s to 11s cwt, according to quality; cauliflowers, from 1s 6d to 8s doz; carrots, 1s 6d to 2s doz bunches; parsnips, 1s 6d to 2s doz bunches; turnips, swede, 6s 6d to 8s cwt, white, 5s to 6s cwt; peas, 4d to 6d lb; pumpkins, £7 10s to £9; rhubarb, 3d, 4d, 5d lb; capsicums and chillies, 1s lb. Salads and Herbs.—Lettuce, worth 6d, 8d, to 1s doz; spring onions, worth 1s 6d to 2s doz bunches; beetroot, worth 1s 6d to 2s 6d doz bunches; celery, worth 1s to 2s 6d doz heads; cress, worth 4d doz

bunches; thyme, marjorum and sage, off stalk, 1s lb; mint, off stalk, 6d lb; sweet basil, sweet fennell, off stalk, 1s 6d lb. Poultry.—Fowls, prime killing, 6s to 7s pair; chickens, from 3s to 4s 6d pair; ducks, young fat, 6s to 8s 6d pair; geese, 10s to 13s pair; turkeys, gobblers, 20s to 24s pair, hens, 14s to 18s pair. Game.—Kangaroo meat and kangaroo tails, $\frac{1}{2}$ d, 1d to 2 $\frac{1}{2}$ d lb, some unsaleable. Carcase meat.—Pork, 40 to 70 lb, 6 $\frac{1}{2}$ d to 7d lb; mutton, worth 5d to 5 $\frac{1}{2}$ d lb; lamb, worth 6d to 7d lb; beef, worth 5 $\frac{1}{2}$ d to 5 $\frac{1}{2}$ d lb; veal, worth 8d to 9d lb. Sundries.—Bonedust, from £6 10s to £7 ton; phosphate, from £4 10s to £5 ton; superphosphate, £6 10s to £7 ton; guano, phosphatic, £3 15s to £4 10s ton; guano, ammonical, £8 ton; coarse bacon salt, £3 10s ton; new corn sacks, 7s 6d doz, second hand, 4s 6d doz; new bran bags, 4s 7d doz, second hand, 3s doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING AUGUST, 1900.

This month was a remarkably wet one in coastal districts between Geraldton and Eucla. Not only was the amount registered considerably in excess of the average, but the actual duration of rain was much greater than usual. In August the fall is, as a rule, confined principally to these districts, with only slight showers on the Goldfields, and farther north, but this month there was a succession of "lows" following one upon the heels of another, leaving only very short intervals of fine weather between. At Perth there were only four days on which rain was not recorded, whilst in the extreme S.W. it rained every day throughout the month except on the 31st. On the Goldfields and North of Geraldton the fall was as usual, light, and in the tropics it was fine throughout.

The climate maps show that the isotherm of 40deg. for mean minimum night temperature has moved from its usual position between Kalgoorlie and Southern Cross to the North Coolgardie Goldfields, and the terrestrial radiation thermometers have indicated several low readings, the absolute minimum being 21.1deg. at Southern Cross on the 8th.

At Perth the mean atmospheric pressure was considerably below the average for previous years. The mean temperature was about an average, but the diurnal range was considerably less than usual, the mean maximum being 2.8deg. below, and the mean minimum 2.7deg. above the corresponding quantities for previous years. The rainfall for August was 216 points above the average, and the total since the beginning of the year shows an excess of 369 points.

THE CLIMATE OF WESTERN AUSTRALIA.

DURING AUGUST, 1900.

FROM TELEGRAPHIC REPORTS.

LOCALITY:	Barometer (corrected and reduced to Sea Level).		Temperature.			Rainfall.	
	High- est.	Lowest.	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	30.016	29.807	83.1	96.8	69.8	nil	1254
Derby	138	922	75.4	93.8	54.2	nil	1407
Broome	104	858	71.3	90.0	51.2	nil	1810
Condon	204	958	64.9	85.2	42.0	nil	1884
Cossack	214	907	67.4	84.1	46.2	nil	4003
Onslow	172	877	63.6	85.0	40.0	8	2695
Carnarvon	300	857	60.4	78.2	41.0	45	1415
Hamelin Pool	329	872	57.4	73.2	39.0	81	771
Geraldton	359	721	59.7	73.0	40.5	248	1958
Hall's Creek	177	794	72.2	95.2	50.2	nil	1466
Nullagine	244	783	62.0	83.5	36.0	nil	1550
Peak Hill	384	942	55.8	75.0	36.4	16	2451
Lake Way							
Que	387	760	54.2	71.8	34.2	41	1933
Yalgoo	385	776	53.9	70.7	31.8	81	1170
Lawlers	447	679	52.6	76.0	23.2	30	1594
Laverton	310	739	50.8	78.4	27.0	20	1452
Menzies	402	650	52.2	77.2	29.7	27	1023
Kalgoorlie	396	681	52.8	77.8	36.0	50	920
Coolgardie	432	586	52.6	77.8	31.2	74	823
Southern Cross	426	600	51.6	72.0	25.0	73	832
York	430	607	52.2	65.4	31.5	360	1708
Perth Gardens	408	563	56.2	67.0	33.8	786	3008
Perth Observatory	417	553	55.2	66.0	33.9	797	3075
Fremantle	383	532	56.6	69.4	41.0	638	2342
Rottnest	357	490	56.0	65.6	46.2	486	2215
Bunbury	418	503	54.8	65.0	35.5	685	3394
Karridale	378	441	54.4	65.5	32.5	731	4126
Cape Leeuwin	382	313	55.8	63.6	44.7	525	3345
Katanning	414	456	50.5	61.8	34.2	296	1500
Albany	434	451	52.3	65.4	41.8	752	2924
Breaksea Island	424	481	53.4	64.6	44.0	517	2194
Esperance Bay	392	459	53.3	74.2	39.8	483	2222
Balladonia							
Eyre	269	575	54.4	81.0	38.5	133	1237

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

RAINFALL for July, 1900 (completed as far as possible),
and for August, 1900 (principally from Telegraphic Reports).

STATIONS.	JULY.		AUGUST.		STATIONS.	JULY.		AUGUST.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	26	3	Nil	..	Millstream ..	..	..	..	..
6-Mile Hotel ..	..	..	..	..	Hong Kong ..	172	4	..	..
Carlton ..	..	..	..	..	Mallina ..	209	3	..	..
Denham ..	..	..	..	..	Whim Creek ..	157	8	Nil	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	180	4	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	..	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	207	4	..	..
Turkey Creek ..	98	3	Nil	..	Balla Balla ..	208	7	..	..
Ord River ..	123	..	..	..	Roebourne ..	178	5	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	161	6	Nil	..
Hall's Creek ..	116	..	Nil	..	Fortescue ..	84	5	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	250	3	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	..	..	..	..
Denison Downs ..	165	..	..	..	Yarraloola ..	175	4	..	..
					Chinginarra ..	225	2	..	..
WEST KIMBERLEY:					Onslow ..	106	6	8	1
Obagama ..	35	3	..	..	Peedamullah ..	..	..	..	..
Derby ..	30	2	Nil	..	Clifton Downs ..	98	9	..	..
Yeeda ..	40	3	..	..	Red Hill ..	101	5	..	..
Liveringa ..	73	2	..	..	Wogoola ..	127	4	..	..
Mt. Anderson ..	62	4	..	..	Yanrey ..	79	4	..	..
Leopold Downs ..	..	..	..	..	Point Cloates ..	150	9	..	..
Fitzroy Crossing ..	252	5	Nil	..					
Quanbun ..	94	4	..	..	GASCOYNE:				
Nookanbah ..	130	3	..	..	Winning Pool ..	143	6	40	4
Broome ..	139	4	Nil	..	Towara ..	88	5	..	..
Thaugoo ..	215	4	..	..	Ullawarra ..	..	..	..	..
La Grange Bay ..	182	5	Nil	..	Woorkadjia ..	100	2	..	..
					Yanyearreddy ..	..	..	..	..
NORTH-WEST:					Williambury ..	91	5	..	..
Wallal ..	101	5	Nil	..	Wandagee ..	..	..	..	..
Condon ..	90	5	Nil	..	Boolathana ..	166	7	..	..
DeGrey River ..	115	4	..	..	Carnarvon ..	103	6	45	..
Port Hedland ..	133	5	Nil	..	Cooralya ..	147	7	..	..
Boodarie ..	151	5	..	..	Doorawarra ..	97	3	..	..
Yule River ..	..	..	..	..	Mungarra ..	103	8	..	..
Warralong ..	135	5	..	..	Errivilla ..	..	..	..	..
Muccan ..	..	..	..	..	Dirk Hartog Is. ..	..	..	..	..
Mulgie ..	..	..	..	..	Sharks Bay ..	78	6	109	7
Eel Creek ..	..	..	..	..	Kararang ..	191	10	..	..
Coongon ..	165	3	..	..	Wooramel ..	92	6	100	4
Warrawagine ..	166	6	..	..	Hamelin Pool ..	102	9	81	6
Bambo Creek ..	184	5	Nil	..	Byro ..	63	5	..	..
Marble Bar ..	164	4	Nil	..	Berringarra ..	..	..	..	..
Warrawoona ..	200	5	Nil	..	Mt. Gould ..	84	2	9	1
Corunna Downs ..	136	3	..	..	Peak Hill ..	55	5	16	..
Nullagine ..	100	7	Nil	..	Abbotts ..	78	6	24	6
Tambourah ..	185	4	Nil	..	Belele ..	45	1	..	..
Mt. Florence ..	..	..	..	..	Mileura ..	56	3	..	..
Tambrey ..	85	4	..	..	Milly Milly ..	..	..	..	..

RAINFALL.—Continued.

STATIONS.	JULY.		AUGUST.		STATIONS.	JULY.		AUGUST.	
	No. of points, 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.		No. of points, 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.
GASCOYNE--Cont.					SOUTH-WEST DIVI- SION, CENTRAL (COASTAL):				
Manfred ..	62	6	41	4	Gingin ..	508	13	1030	23
Mellya ..	155	6	..	..	Belvoir ..	439	12	802	21
Woogarang ..	81	4	..	..	Guildford ..	559	14	871	25
Boolardy ..	..	..	..	..	Canning Timber Mills ..	723	12	1238	25
Wooleane ..	87	5	..	..	Canning Water- works ..	713	16	1092	24
Dairy Creek ..	110	2	..	..	Perth Gardens ..	536	16	786	26
Murgoo ..	74	5	59	5	" Observatory ..	558	16	797	27
Mt. Wittenoom..	127	6	71	4	Subiaco ..	509	15	721	26
Nannine ..	45	2	5	..	Claremont ..	563	16	780	27
Star of the East	1	1	..	..	" (Richardson)	494	15	732	25
Annean ..	89	3	..	..	Kalbyamba ..	675	15	783	26
Tuckanarra ..	74	3	43	5	Fremantle ..	483	15	638	27
Coodardy ..	99	5	..	..	Rottneet ..	506	18	486	27
Cue ..	112	6	41	4	Rockingham ..	691	13	687	24
Day Dawn ..	92	5	23	3	Jarrahdale ..	884	14	1050	23
Lake Austin ..	103	4	34	5	Mandurah ..	728	17	707	26
Lemmonville ..	102	7	55	7	Pinjarrah ..	924	15	761	21
Mt. Magnet ..	112	6	65	7	Harvey ..	698	18	780	23
Challa ..	67	4	45	3	SOUTH-WEST, CEN- TRAL PART (IN- LAND):				
Youeragabbie ..	120	5	..	..	Goomalling ..	225	9	..	..
Murrum ..	71	5	..	..	Culham ..	358	13	456	20
Yalgoo ...	46	5	81	..	Newcastle ..	437	12	621	19
Gabyon ...	92	6	63	3	Eumalga ..	362	14	538	21
Gullewa ...	103	11	122	12	Northam ..	266	14	298	19
SOUTH-WEST DIVI- SION (N'N PART):					Grass Valley ..	204	10	294	18
Murchison House	252	12	..	..	Meckering ..	189	14	..	..
Mt. View ..	196	14	262	20	Doongin ..	110	8	..	..
Yuin ..	133	10	115	7	White Raven ..	186	12	..	..
Northampton ..	308	12	467	11	Sunset Hill ..	217	11	275	16
Mt. Erin ..	377	12	369	12	Cobham ..	368	15	365	23
Oakabella ..	387	11	..	..	York ..	327	14	360	..
Narra Tarra ..	347	9	..	..	Beverley ..	222	11	246	13
Mullewa ..	121	5	171	7	Barrington ..	232	10	280	16
Bootenal ..	335	10	..	..	Sunning Hill ..	287	10	342	14
Geraldton ..	405	14	243	..	Wandering ..	509	15	539	20
Greenough ..	479	16	336	14	Pingelly ..	288	9	284	18
Dongara ..	327	16	240	17	Marradong ..	493	13	595	16
Dongara (Pearse)	316	14	221	15	Bannister ..	470	11	578	18
Mingineew ..	299	12	376	16	Narrogin ..	249	13	272	21
Rothsay ..	108	10	159	13	Wickepin ..	270	7	323	13
Field's Find ..	56	4	66	5	SOUTH-WEST DIVI- SION (S'N PART):				
Carnamah ..	179	11	284	18	Bunbury ..	629	17	685	24
Watheroo ..	280	11	281	18					
Dandaragan ..	371	15	628	20					
Moora ..	247	13	339	18					
Yatheroo ..	396	17	750	20					
Walebing ..	290	15	431	20					
New Norcia ..	373	13	542	19					

RAINFALL.—Continued.

STATIONS.	JULY.		AUGUST.		STATIONS.	JULY.		AUGUST.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Collie Saw Mills	936	15	..	..	—Continued.				
Donny Brook ..	741	15	926	25	Mt. Morgan ..	56	4	29	5
Boyanup ..	601	17	750	25	Laverton ..	63	5	20	..
Busselton ..	844	22	689	27	Murrin Murrin ..	81	4	28	5
Quindalup ..	622	12	794	14	Pendennie ..	71	3	16	3
Margaret River..	1084	20	824	22	Tampa ..	75	6	16	3
Lower Blackwood	900	16	940	27	Niagara ..	99	7	8	1
Karridale ..	1058	24	731	..	Yerilla ..	71	6	..	..
Cape Leenwin ..	748	23	525	..	Edjudina ..	47	5	..	..
The Warren ..	849	19	..	..	Meuzies ..	67	5	27	6
Lake Muir ..	458	14	614	27	Goongarrie ..	44	3	36	3
Mordalup ..	378	14	622	30	Kurawa ..	34	7	41	5
Riverside ..	458	17	701	30	Dixie Mine ..	43	9	44	6
Balbarup ..	612	16	789	29	Kurnalpi ..	58	8	66	10
Mandalup ..	662	14	1005	25	Bulong ..	88	9	41	10
Bridgetown ..	738	19	859	30	Kanowna ..	73	8	62	11
Greenbushes ..	891	16	943	27	Kalgoorlie ..	46	7	50	7
Williams ..	447	10	430	18	Coolgardie ..	58	10	74	12
Arthur ..	399	10	332	18	Burbanks ..	39	7	69	7
Darkan ..	416	8	..	..	Londonderry ..	56	10	68	8
Wagin ..	233	12	263	19	Widgiemooltha..	57	8	77	9
Glencove ..	231	10	305	14	50-Mile Tank ..	67	7	118	11
Dyiliabing ..	90	7	223	9	Norseman ..	99	8	51	11
Katanning ..	393	13	296	19	Bulla Bulling ..	54	..	96	..
Kojonup ..	292	10	409	21	Woolgangie ..	61	8	80	5
Broomehill ..	293	7	412	23	Boorabbin ..	65	8	74	9
Sunnyside ..	239	10	287	22	Karalee ..	61	5	89	6
Woodyarrup ..	204	11	224	19	Yellowdine ..	7	2	34	5
Cranbrook ..	233	12	270	20	Southern Cross..	54	7	73	7
Blackwattle ..	279	11	..	..	Mount Jackson ..	53	5	..	..
Mt. Barker ..	330	14	504	23	Bodallin ..	82	9	..	..
St. Werburgh's..	253	17	..	..	Burracoppin ..	20	2	..	..
Forest Hill ..	493	20	537	30	Kellerberrin ..	165	12	227	12
Denmark ..	566	18	..	..	Mangowine ..	131	13	..	..
Albany ..	412	15	752	28	EUCLA DIVISION:				
Point King ..	426	15	772	25	Coconarup ..	..	..	..	..
Breaksea ..	360	14	517	25	Fanny's Cove ..	266	9	..	..
Cape Riche ..	..	..	..	..	Park Farm ..	272	10	..	..
Pallinup ..	223	9	208	12	Esperance ..	372	15	483	..
Bremer Bay ..	226	9	330	19	Gibson's Soak ..	286	9	..	..
Jarramongup ..	244	10	..	..	30-Mile Condenser	245	7	..	..
EASTERN DIVISION:					Swan Lagoon ..	211	10	..	..
Lake Way ..	..	..	..	..	Grass Patch ..	208	8	..	..
Lawlers ..	90	5	30	6	Lynburn ..	..	..	..	..
Diorite King ..	89	4	25	3	Israelite Bay ..	113	11	212	13
Sturt Meadows..	92	4	26	4	Balladonia ..	67	7	117	9
Mt. Leonora ..	85	4	38	4	Eyre ..	161	12	183	..
Mt. Malcolm ..	82	3	37	4	Eucla ..	209	13	134	10

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF
AUGUST, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of											
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.
FREMANTLE	6	9	1637	1637	..	..	3	1637	..	633	..	..	..	211	..	578	213	..	..	..
ALBANY	5	5	233	233	4	..	..	233	..	23	..	..	..	83	..	171	2	..	..	..
GERALDTON	1	1	5	5	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..	5
HAMPTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	12	15	1595	1591	4	..	3	1595	..	678	..	..	..	244	..	749	215	..	..	5

DEPARTMENT OF AGRICULTURE,

5th September, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF AUGUST, 1900.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.														All Other Trees
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.		Vine Cuttings.
FREMANTLE ..	12	23	23894	22	23894	1	23894	56	1495	9340	150	..	100	495	..	5	3301	3191	38	203	3018	2000	49
ALBANY ..	6	7	1446	7	1446	..	1446	13	445	454	35	12	6	12	..	..	..	98	204	82	106	..	42
GERALDTON ..	1	1	250	1	250	..	250	2	..	..	..	..	..	..	..	..	250	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	19	30	25690	30	25690	..	25690	71	1940	10894	185	12	106	508	..	5	3554	3289	242	240	3134	2000	91

DEPARTMENT OF AGRICULTURE

5th September, 1900.

1900.

WESTERN AUSTRALIA.

DEPARTMENT OF AGRICULTURE.

REPORT

BY THE
SECRETARY TO THE DEPARTMENT OF AGRICULTURE
FOR THE
YEAR ENDING DECEMBER 31ST, 1899.

Presented to both Houses of Parliament by His Excellency's Command.

Perth:
Paragon Printing Works, 105 Murray Street.
1900.

DEPARTMENT OF AGRICULTURE
OF
WESTERN AUSTRALIA.

Annual Report for the year ending December 31st, 1899.

*To the Hon. the Minister for Lands, presiding over the
Department of Agriculture.*

SIR,

I have the honor herewith to submit a report of the work done
by this Department during the year ending 31st December, 1899.

I have the honor to be, Sir,

Your obedient Servant,

L. LINDLEY-COWEN,

Secretary.

DEPARTMENT OF AGRICULTURE.

*Report by the Secretary of the Department of Agriculture
for the Year ending 31st December, 1899.*

SIR,

In October last year I submitted a report of the work done by this department to the previous June 30th, but it was considered too voluminous to ever have any hope of being printed.

The annual reports of the Department of Agriculture of other countries are, in all cases, complete and interesting records of the practical and scientific work accomplished during the preceding 12 months, and are eagerly looked forward to by kindred departments, societies and that section of the public interested in agronomy. It is a pity, therefore, that this department should be the exception, and have little or nothing to offer in exchange for the valuable literature we receive from other departments.

I now beg to submit a short report of work done by the various branches of this department.

It is gratifying to know that the work is steadily on the increase, and this is to be accounted for by the growing interest the public is taking in the department.

As I shall submit a supplementary report to the 30th June in the course of a few days, in which I shall take the opportunity of more fully reviewing the work of the whole year, it is not necessary for me to add anything further to this.

I have the honor to be, Sir,

Your obedient Servant,

L. LINDLEY-COWEN,

Secretary.

HORTICULTURAL AND VITICULTURAL BRANCH.

With something over 4,000 individuals engaged in vine and fruit growing in the colony it is only natural that the work of this branch should be very heavy.

While the area under fruit and vines has not made any very remarkable increase, it is very gratifying to know, judging by the communications received by the department, that growers are exercising every possible care in looking after their plantations. The demand for information, both in the matters of pruning and cultivation and how to combat insect and fungus pests, is daily on the increase, and I must again urge the early publication of the revised issue of the Handbook of Horticulture and Viticulture; a work prepared by Mr. Despeissis in 1895, and now long out of print. I have made frequent applications for the money for this most important work, but so far have not been able to obtain it. There is a demand for the work from all parts of the world, and the Agent-General is particularly anxious to secure a large number of copies. As the vineyards of the colony are coming into bearing, and there is a large proportion of small growers, it will be necessary that some provision be made for the establishment of central wineries. It is a question that the Government and Parliament should consider, as to whether any assistance should be given to Companies already in existence or whether this Department should take the matter in hand by itself. This is a matter that I shall deal with more fully in a supplementary report, so will leave it for the present.

The Viticultural Expert, has, during the period under review, with the assistance of several of the larger vine growers, revised the "Distillation Act," and I am glad to see that the amended Act is likely to receive the attention of Parliament during the present session. In the interests of the vine growers it is very important that this Act should be made less cumbersome and more workable.

The Horticultural Expert has done a great deal of good work during the year, in impressing upon growers of fruit the necessity of using uniform packages. I have been in communication with various firms in the Eastern Colonies and the United States with a view to introducing a cheap and uniform case, not only for hard but also for soft fruits. Packing, and the general get up of the fruit, has a great deal to do with its profitable disposal. The Expert has also been engaged in procuring, packing and shipping consignments of fruit to the Agent-General in London. The reports have been, in all cases, most favourable, notwithstanding the fact that in several instances the fruit was shipped as ordinary cargo, and consequently under the most disadvantageous circumstances.

When the export of fruit starts, this colony will have a very great advantage over those to the eastward in being so much nearer the Home markets.

The number of models of specimen fruits has been added to during the year, and it is particularly requested that growers who have typical specimens of fruit during the coming season will send them in to the Department for the purpose of being modelled. The Agent-General is continually asking for models of West Australian grown fruit.

The cultivation and growth of new products in our tropical Nor'-West has received the attention of the Expert during the year, and every encouragement has been given to individuals to lay out experimental plots. There seems to be no doubt that tropical fruits can be grown in the Nor'-West, and the Government should, I think, offer some substantial inducements for their production.

At the suggestion of the Viticultural Expert, the Department imported from France and the United States a large number of new varieties of vines, which were rooted, the necessary precautions to prevent the introduction of disease having been taken at Fremantle, and in the quarantine ground at Subiaco. The vines included some of the more choice varieties of French wine grapes and table grapes from California, and also phylloxera resistant varieties.

It is worth noting that the cultivation of pippin fruits still retains the lead amongst the fruit crops of this colony. This is due to the extraordinary suitability of the colony to the production of apples, pears and quinces, and also to the fact that Western Australia, unlike the Eastern colonies, is still absolutely free from the Codlin moth.

In reference to the importation of fruit trees and plants, the Horticultural Expert makes the following remarks:—

“This year again, and to a much more noticeable extent than the previous year, these returns show a decrease in the total number of cases of fruit imported. There was in 1898, as compared with 1897, a decrease of 6,592 cases. In 1899, when compared with 1898, the decrease was three times as large, or 18,531 cases. Out of a total of 30,464 cases imported, 251 were prohibited, either because they contained fruit the importation into this colony of which is prohibited, or because the contents were affected by noxious pests which we are striving to keep out. The decrease is noticeable in all classes of fruit except cherries (530 cases) gooseberries (209 cases) and rhubarb (59 cases).

“The importation of grapes, which in 1897 amounted to 1,804 cases, was only nominal in 1899, consisting of 22 cases. Apricots, of which 380 were introduced in 1898, came down to 189 cases in

1899. Of the other fruits in proportion, and noticeably oranges, plums, and passion fruit, the number of cases imported last year was only half as compared with the previous season.

"When, on the other hand, the importation of fruit trees and plants are considered, although there is a decrease of 44,585 as compared with the previous year, this decrease is in reality fictitious, being more than accounted for by a decrease of 113,301 in the importation of vine cuttings together with a few paltry hundred of apricots, mulberries and almonds. We find on the other hand a marked increase in the number of apple trees imported (9,009), lemons (11,054), oranges (10,566), and pears (5,599), not to speak of cherries, figs, nectarines, plums, small fruits and others, which altogether show an increase of 23,000 when compared with 1898. From these figures it is reasonable to infer that the importation of fruit is decreasing, and as the population is increasing and prices are lower, the local production of fruit must be progressing rapidly."

The importation of fruit trees, on the other hand, is increasing, and as the resources of the local nurseries were also severely taxed last year, it is natural to infer that the acreage under fruit trees during 1899 must have been materially increased.

INSECT PESTS ACT.

Towards the latter end of the year the administration of the Insect Pests Act, which had been checked for some time, was more vigorously carried on.

Among the most troublesome pests we had to contend with during the year were :—

San José Scale (*Aspidiotus perniciosus*), which was found in 51 orchards and gardens, on 358 trees, 219 of which were destroyed by fire, while the owners of nine orchards, with 139 affected trees, preferred to procure a fumigating outfit, and treat their trees by means of hydrocyanic acid gas.

2. Fruit Fly (*Halterophora capitata*), called the European Fruit Fly, to distinguish it from the more formidable Australian Fruit Fly (*Tephrites Tyroni*), which has of late been a serious menace to the fruit crops of Queensland and New South Wales.

Numerous circulars, leaflets, and written as well as verbal instructions were issued in order to acquaint growers in the affected localities, along the Swah, as to the best methods of coping with this pest. This fly, so far, has not got beyond the locality of the Swan. A few outbreaks have been reported from the spur of the Darling Ranges, in the vicinity of Helena Vale. Although the pest was increasing to an alarming extent it would have been possible then, provided everyone had lent assistance, to completely eradicate the Fruit Fly from Western Australia. This could only have been effected by a systematic and combined process of starving the fly out, that is to say by stripping every tree and bush

bare of fruit from August, when the late oranges go off. With this object in view the Department issued a circular notice to growers within the infested area to strip their trees of oranges and other ripe fruit by the 15th August. This step would not have entailed the least amount of hardship on the growers, as there is practically no ripe fruit on the trees by that date. It would, moreover, have resulted in great benefit to the growers in ridding at least whole districts of the fly. Many of the growers, however, entirely disregarded that notice, and obstinately refused to pick their fruit when advised, and thereby starve out the fly. As a result the fly, which before the end of the year commenced to make its presence known in many gardens amongst the early summer fruit, proved, later in the season, most troublesome around Perth and the suburbs.

In September a Phylloxera and Vegetation Diseases Conference met in Melbourne, at the instance of the Government of New South Wales, which convened the conference. The following colonies were represented:—New South Wales, six delegates; Victoria, six delegates; South Australia, two delegates; Queensland, two delegates; and Western Australia, one delegate, the Viticultural Expert. The subject matters discussed at the conference were dealt with under two headings—(1) the Phylloxera question, pure and simple, as it affects Australia; and (2) the Vegetation Diseases Act. Each resolution passed at the conference took the form of suggestions, recommended for adoption by the several colonies, in order to guard in the future against past errors, and to indicate the best known methods of coping with the pests.

DAIRYING BRANCH.

For some time past the Dairy Expert has been experimenting with various fodder plants, with a view to ascertaining those most likely to grow on the sandy country extending along the coast. The principal experiments have been made at the quarantine ground at Subiaco, where the soil is almost pure sand, and where the conditions are anything but favourable. Of all the various plants tried so far, nothing has come up to the grass *paspalum dilatatum*. All the summer through it not only remained green, but kept on growing. It attained a height of from 18 inches to two feet, which is short for this grass, but good when the nature of the soil is taken into consideration. At Drakesbrook the same grass obtained an average height of six feet three inches, and that after it had been cut in December. Several kinds of Saltbushes were sown and came up, but most of them died out, only one plant surviving the summer. The season broke up so late that the plants did not have a fair show, and the experiments will be continued this coming season.

Enquiries with reference to the purchasing of stock kept coming in in ever increasing numbers, and through the medium of the Department many sales have taken place.

The Expert has had most interesting enquiries from the more Northern parts of the colony as to its suitability for dairying and pig-breeding. Beagle Bay is one of the places where pig raising could be carried on economically, as pigs can be raised there at a minimum cost, owing to the quantity of natural feed. In the Gascoyne District, from the coast to the Kennedy Ranges, the river flats are reported as being well adapted for dairying and pig raising, the feed being good and water easily obtained by sinking to a depth of from 15 to 25 feet. Objection has been taken to the heat, and that dairying and pork curing could not be carried on successfully on that account. Under the modern conditions of dairying and pork curing the temperature makes but very little difference. As a matter of fact, dairying is now most successfully carried on in northern Queensland, and some of the best ham and bacon coming into this colony comes from there. In the case of butter a difficulty might arise as to getting it regularly to market, owing to the lack of steam communication, but this would not apply to cheese, as a monthly boat would meet all requirements. This would likewise apply to ham and bacon factories.

All through the season the demand for sheep, both store and breeding, has been very great, and the supply has been far behind the demand. Breeding ewes specially have been wanted, and numbers of them have changed hands as high as 20s. each for ordinary good sorts. The demand was so great that the Department got quotations from agents in the Eastern colonies, but so far as I know, advantage was not taken of the sheep offered.

During the year the Department acquired a travelling dairy plant. This consists of the latest appliances for butter making and testing milk, and was exhibited at nearly all the shows in the colony, where it attracted much attention. The Department sent out notices that any society desiring the dairy to work could have it for a week or more on condition they provided a certain quantity of milk per day. The dairy would then go to their district and work daily, all the processes being gone through. Only two societies took advantage of this offer, the rest looked upon it apparently simply as an additional attraction to their shows, and asked that it might be exhibited at them. But even this had a good effect, as the majority of the farmers had never seen the latest appliances for labour-saving now used in the manufacture of butter. One portion of the plant that was at work at nearly all the shows was the milk-testing appliance, and many farmers brought in milk from various cows to have it tested. Too much stress can scarcely be laid upon the necessity of testing the milk of each cow in the herd.

Although, up to the present there is only one butter factory in the Colony, the Expert reports that dairying is going ahead steadily and surely. This industry cannot, like many other branches of agriculture, go ahead *very* rapidly; even under the most favourable

circumstances its growth is comparatively slow. The only way to increase a dairy herd is to breed or to buy. Breeding is necessarily slow, and where there are not dairy cattle for sale, buying is out of the question. That greater attention is being paid to dairying in the south-west is evident from the demand there has been for the use of the Government bulls, and also from the inquiries that are continually coming forward as to where good cows can be obtained, and many of the farmers in that district have considerably increased their herds. The Expert reports that there is a growing demand for pure-bred bulls of dairy breeds, and the Department has had numerous inquiries as to where they can be obtained, and in many instances has been able to supply the information, and locally-bred animals have been purchased.

Cheese-making, so far as the Expert is aware, is at a standstill, little or no cheese being made in the colony, although in many districts this branch of industry would be more profitable than butter-making.

The Expert reports a great improvement in the breeding of pigs. A few years ago anything in the shape of a pig was considered good enough to breed from, but lately there has been a fair demand for pure-bred boars, and many have been distributed amongst the farmers by the breeders, and a few have been imported. Those most in favour have been the Berkshires.

Sheep are, in the Southern districts, most decidedly improving, and pure bred rams are to be found in almost every flock. The Shropshire is steadily growing in favour with those who wish to combine mutton and wool. The Shropshire ram on the ordinary crossbred ewe gives splendid, large, rapidly maturing lambs.

In the matter of poultry the Expert reports that rapid changes for the better have taken place, and the general run of birds has been greatly improved within the last two years. It is the exception now to see a lot of poultry without a pure bred rooster, and often a great many pure bred hens. Ducks might be kept in much greater numbers than they are. In many instances they would be more profitable than fowls, laying at a time when eggs are scarce and being ready for market much earlier than fowls. Turkeys are greatly neglected in the colony, and the average quality found here is very poor indeed. A few persons have imported American Bronze, but they are in a few hands. In the Eastern districts, especially, where large areas of wheat are grown, turkeys would prove most remunerative. They could be fattened on the stubbles and would help to keep the crop clean. Geese do not receive much attention, but the demand either for them or their eggs is small, and, as a rule, the birds themselves bring low prices in the markets. They might be profitably kept and bred on many farms for home use, and save killing sheep that are so valuable just now. Geese cost little to keep where they can get grass.

BEES.

This industry is slowly but steadily advancing, and there are some fairly large apiaries now in the colony. The box framed hive is also steadily taking the place of the old gin case. The two greatest enemies the bee-keepers have to contend against are Foul Brood and the Wax Moth. During the session a Bill entitled the "Contagious Diseases (Bees) Act," received the assent of Parliament, and inspectors have been appointed to see that its provisions are carried out, and it is hoped that this will lead to the mitigation of these scourges.

BIOLOGICAL BRANCH.

The work in this branch practically ceased, for the time being, on the 31st December, owing to the departure of Mr. Helms to take up a more lucrative position in the Department of Agriculture of New South Wales. Mr. Helms was a most enthusiastic and conscientious worker, and I much regret his loss. He did most admirable work in connection with the Coolgardie Exhibition, and was the means of attracting attention to settlement and more particularly in testing the flours and wheats exhibited for gluten contents, with the result that once more the West Australian products came out far ahead of the imported. Mr. Helms' work also included the collection and preparation of exhibits for agricultural shows where they attracted much attention. The department also had an exhibit in the Manufacturers' Exhibition, which attracted a good deal of attention. A large amount of correspondence has been conducted in relation to insect pests, numbers of specimens having been sent in for identification and information. These include destructive caterpillars and grubs, flies, native bees, leaf-eating insects, scales, etc. Fungus diseases, notably the fungus on loquats and ear cockle in wheat, were also dealt with. All these specimens were investigated, identified, and the required information supplied to the senders. Amongst the insects causing trouble were the caterpillars of the Vine Sphinx (*Cheimocampa Celeria*), which seems to have been more than usually numerous during the season under review, giving trouble amongst young vines, where its voracity is soon severely felt, while the older and more vigorous vines are better able to combat it. The usual complaints about cutworms have also been heard of. From Waterloo a botfly was sent in for identification, and it would appear that this parasite is steadily spreading, and is likely to give a good deal of trouble amongst horses. From Victoria Plains some ears of wheat were sent in which appeared to be affected by "Take-all," a disease not previously brought under the notice of this department. The periodical "Codlin Moth" scare occurred, but upon investigation proved, as in all previous cases, to be without foundation. A good deal of time was occupied in answering questions in regard to bee-farming, and in investigating the cause of the falling off in the number of hives during the past year. Regulations were framed

for the inspectors under the "Contagious Diseases (Bees) Act," and several articles were written on apiculture. A number of new and interesting specimens were collected for the Museum, which has been maintained in good order during the past year.

BOTANICAL BRANCH.

In addition to the work of the Government Botanist, encouragement has been given to the Mueller Botanic Society by allowing the use of the Department's Museum for the meetings of that society.

The work done by the Botanist, in addition to the identification of the numerous plants that are daily sent in for that purpose, has included the collection of native poison plants, and their transmission to Professor Balfour, of Edinburgh University, from whom word has been received that the case forwarded to him had come to hand. The plants had been placed in the hands of Professor Stockman, who was formerly assistant to Professor Fraser, of Edinburgh, but has been recently appointed to the Chair of *Materia Medica* in the University of Glasgow; and a report may be looked for from him after he has had time to investigate the plants and their properties.

A large and varied assortment of seed were received from Drakesbrook, where they were cultivated during the last season by Mr. G. F. Berthoud, who is in charge of the Departmental Experimental Farm there. The collection comprised flower and vegetable seeds, grains, grasses, and other miscellaneous seeds, all of which appeared to be well developed and ripe. Supplies from this stock have been forwarded to the Parks and Gardens Committee, the City Council, Zoological Gardens, railway stations a few State schools, and others interested in gardening and likely to set an example to the public generally in the much-needed amelioration of the desert-like aspect of most parts of the Metropolis. A selection was also set aside for the use of the Department of Education, but still awaits acceptance by that Department.

Seeds of some of the native plants having special points of interest have also been supplied to botanic establishments at Tahiti, the Straits Settlements, and elsewhere.

EXPERIMENTAL WORK.

Too much praise cannot be bestowed upon the officer in charge of the experimental plots at Drakesbrook for the energy and accuracy with which he carries out his important duties. In addition to growing hundreds of varieties of crops for experimental and exhibition purposes, a very large number of manure tests have been made.

1900.

WESTERN AUSTRALIA,

DEPARTMENT OF AGRICULTURE.

SUPPLEMENTARY REPORT

FOR THE

HALF-YEAR ENDING JUNE 30TH, 1900.

Presented to both Houses of Parliament by His Excellency's Command.

Printed by :

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1900.

DEPARTMENT OF AGRICULTURE
OF
WESTERN AUSTRALIA.

*Supplementary Report for the Half-year ending 30th
June, 1900.*

*To the Hon. the Minister for Lands, presiding over the
Department of Agriculture.*

SIR,

I have the honor to herewith submit a Supplementary Report on the work done by this Department during the six months ending June 30th last. As the agricultural year ends during the period under review, it is a much more opportune time to make a report than for the half-year closing on 31st December.

I have taken the liberty of making certain suggestions, which I hope will receive your kind consideration and meet with the approval of the Government and Parliament.

I have the honor to be, Sir,

Your obedient Servant,

L. LINDLEY-COWEN,

Secretary.

CLERICAL.

The clerical work, in sympathy with the general growth of the Department, again shows a steady increase. During the period under review over 4,000 letters and minutes were received, and over 3,000 sent away, necessitating the opening up of over 500 new files. This does not include over 20,000 publications issued from the office during the period under review. The number of files show a falling off, but this is due to a simplified method of recording the correspondence, which had to be adopted by our very limited clerical staff in order to cope with the work. During the year it was found impossible to carry out the clerical work, with the necessary punctuality and dispatch, without an increase of the staff, and, accordingly, the then messenger (Mr. A. Arnold) was appointed a clerk, and a new messenger engaged. As evidence of the increased volume of work done by the clerical staff, I may mention that during the past year the official postage of this Department increased over 50 per cent. as compared with that of the previous year.

THE OFFICES OF THE DEPARTMENT.

The offices of the Department are situated on the fourth floor of the West Australian Buildings, and consist of a Museum and reading room and seven offices, for which a rental of £250 per annum is paid. The question of rent crops up annually, and it is for this reason I am drawing attention to the premises occupied by the Department. In the Museum the annual Producers' Conferences are held, and, presuming these may now be considered as annual fixtures, if we had not this room the Department would have to rent one of the public halls for the purpose at a cost of something like £30 for the week over which the Conference extends. The possession of such a room therefore reduces the rent by this amount. Again, the free use of the room is always given to societies in sympathy with the work of the department. The Library and Museum are open to the public, and, judging by the number of visitors, this privilege is appreciated, and has done much, not only to promote settlement, but also to advance the ideas and stimulate the energies of those already settled on the soil. During the last three months the books in the Library have all been sorted, reclassified, renumbered, catalogued and indexed. All loose copies and pamphlets have been bound, and the Library is now in first-class order, and any book can be found at a minute's notice. There are at the present time over 700 books in the Library, as well as files of all the useful agricultural papers. The number of the latter has been added to during the past year by the introduction of several valuable publications, which are freely used by the officers of the Department and the visitors. Circulars have been sent out to all agricultural societies and papers not already contributing, asking them to forward their publications in exchange for ours, and this should very considerably increase the number of volumes, and the value to the public, of our Library.

The Museum has received a good overhaul and has been put in order, the specimens catalogued, and a number of new photographs added. A collection of seeds in bottles has been made up and placed in a case for reference and exhibition at the various shows. The fruit models have been classified, catalogued and numbered, broken ones repaired, and a number of new ones added, making a total of 307 fruit and vegetable models now on view in our museum.

I am asking for provision to be made on the estimates this year for an additional officer, who will, if appointed, act as curator of the Museum, librarian and sub-editor of the JOURNAL. The officer who is now doing this work took the place of the Biologist, Mr. Helms, (the loss of whose services I much regret) but I am anxious that he should be relieved of this work, and take up the duties of Field-officer, a position for which he is especially fitted by reason of his long training at the Hawkesbury College in New South Wales. His duties, under this head, would be to continually move about amongst the settlers and endeavour to persuade them to improve their methods of culture, and give practical demonstrations and lectures. The JOURNAL demands, in detail, more attention than I can possibly give to it, and, as I have endeavoured to show, the Library and Museum are assuming such proportions as to require the individual attention of an officer specially appointed for the purpose. Attending to the numerous visitors, and answering their queries, takes up a good deal of this officer's time.

PUBLICATIONS OF DEPARTMENT.

Owing to retrenchment, the publication of the *Producers' Gazette* was suspended in June, 1899, and the department was left without any official organ.

Parliament having approved of the expenditure, the publication of a JOURNAL, on a very much less elaborate scale than the *Gazette*, was commenced in January, and has been continued monthly ever since. The *Gazette* was issued free, but the small charge of 2s. 6d. per annum is made for the JOURNAL, and I am glad to report the paying subscribers are gradually, though very surely, increasing every month, which is evidence of the growing appreciation of the JOURNAL. I am particularly anxious to be provided with funds for an immediate re-issue of a revised and enlarged edition of the *Handbook of Horticulture and Viticulture*, by Mr. Despeissis, the Expert of the Department. This work has been out of print some years now, and there is an ever-increasing demand for it both locally and outside the colony. The work will be sold and not distributed free as before, and sales and advertisements should nearly cover cost. The same remarks apply to the *Settlers' Guides*, 30,000 copies of which were printed, and the first edition is nearly exhausted, there being a steady demand for them locally and abroad. Two more parts yet remain to be issued to make the series complete, Part 7, on pork raising and curing, Part 8, on poultry, bees, and the minor products of the farm

and garden. It is by means of such publications as these I have enumerated the department brings itself into closer touch with the producers, and is, while doing the settlers practical good, also encouraging further settlement and advertising the resources and possibilities of the colony. I should much like to see the Stock, Woods and Forests and Fisheries Departments contribute articles of a practical nature to the JOURNAL, especially the former with its staff of veterinary surgeons. There is ample room for regular contributions on the more prevalent diseases of stock. Contributions are invited from all and sundry interested in the cultivation of the soil, and articles of exceptional merit are paid for.

AGRICULTURAL ADVISORY BOARD.

When the Bureau of Agriculture was placed under your control and became, as it is now, the Department of Agriculture, the members of the Bureau were, by order of the Governor in Council, appointed an Agricultural Advisory Board. The Board meets only at the request of the Minister, and deals only with subjects submitted for its consideration by him. During the past twelve months the Board has been summoned at your request on several different occasions, and the results of its deliberations submitted to you. It is not for me, perhaps, to thank the Board for its purely honorary services, but I must ask you to permit me to record my appreciation of its work, and more particularly to the members individually for the advice so freely given to me, as Secretary to the department, from their more ripened experience. It requires no ministerial mandate for their wise counsels to be readily placed at my disposal. I sincerely wish I could thus end my remarks on the Board, but I cannot do so, I am deeply sorry to say, without having to record the removal by death of one of the original members—the Hon. J. G. H. Amherst. It is not necessary for me to say more, for we all know how universally he was loved and respected, and by none more than myself. The Governor in Council was pleased to appoint the Hon. H. Lukin, M.L.C., of “Haysthorpe,” Beverley, to the vacancy.

MINISTER FOR AGRICULTURE.

I beg to draw your attention to the following resolution passed at the last Producers' Conference:—

“That in the opinion of this Conference the time has arrived when, in the best interests of agriculture, the industry should be represented in the Government by the designation of ‘Minister for Agriculture’ being conferred upon the Minister holding the portfolio for ‘Lands.’”

This is the only colony in which there is no Minister for Agriculture, and I should much like to see effect given to the resolution, as a compliment to our ever-growing industry,

and also I may say, to this Department. I should like to add that a movement is on foot in New South Wales to place the Agricultural Department under a separate Minister, instead of, as at present, being a branch of the Mines Department. Some years ago when this arrangement was first made the Agricultural Department was small and could be worked in this manner, but with the great developments in agriculture of recent years, it is found a very unsatisfactory arrangement, the Department has grown with the times. Settlers and people connected with agriculture are dissatisfied with their Department being under several heads and branches. It is now proposed to join together such departments as Agriculture, Stock and Brands, Water Conservation, Artesian Bores (inland), Forests and Nurseries, Export Boards, Fruit Inspection, Refrigerating Stores, Colleges and Farms, Seed Distribution, Grants to Agricultural Societies and National Shows, and all matters connected with agriculture and form into one department with a permanent head, with a Minister of Agriculture as the political head of the department, who would be able to look after agricultural interests in the Ministry and in the Assembly. These remarks are in every way applicable to this colony.

AGRICULTURAL EDUCATION.

I think the time has arrived for more active measures to be taken in the matter of agricultural education, both practical and theoretical. I am glad to be able to record that the Education Department has at last taken this matter up, and this department has been able to render it some slight assistance. But much more is required than the Education department can reasonably be expected to perform. During the past twelve months a number of young fellows have arrived here from England seeking positions on farms and orchards with a view to gaining experience in practical husbandry. Many more have tried the goldfields, and finding the conditions of life there unsuitable, have come to me to find them places on farms. Though the demand for farm hands has so far been always brisk, it is by no means an easy matter to find an opening for a "tenderfoot," who, on his own confession, knows absolutely nothing about the work. Consequently I have been only partially successful in finding employment for those who have applied to me, and I regret to say that many of them have left the country again. This is the more to be regretted, as without exception they all appeared to be of the right stamp, and several of them were able to show me that they had moderate means at their disposal when they could satisfy their people at home they had learnt something of colonial husbandry. There is no country in the world offering so many inducements to settlement as this, and it is a pity it should be driven from us. I suggest that a training farm should be established by the Government, or that a certain number of farmers, active, educated, and up-to-date in their methods of culture, should be subsidised to take in young fellows such as I have described for two years. Personally, I think, the State farm is the

better plan. I do not believe in colleges and professors, but I do not see why a moderate sized farm cannot be as well managed by this Department, and be made as well to serve this useful educational purpose, as by an individual. This Department has all the Experts necessary for the work, and the only addition required would be a competent and practical manager. Again, such an institution would be of immense advantage to this Department in its experimental work.

I noticed in a London paper the other day the Agents General had been interviewed on the inducements their respective colonies have to offer to young men, and much to my regret I saw it stated—and sadder still the statement is true, wherein it differs so much from many newspaper assertions—that this is the only colony without provision for the raw youth wishing to settle on the soil. Queensland spends—the following figures are taken from official publications—£33,257 a year on its Department of Agriculture, College, and State farms. New South Wales, £60,092; Victoria, £51,950; New Zealand, £63,873; South Australia, £7,739; Western Australia, £5,555. The two last colonies most backward in the group are those that spend the least on their Agricultural departments—South Australia and Western Australia. The question may be asked: Are they so backward because their respective appropriations in this respect are so small? Or, are their appropriations so small because agriculture is so backward? It is a question of cause and effect, and a question I do not propose to answer, but the fact remains that acre for acre, those colonies spending freely have secured settlement and prosperity, while we, in spite of the most liberal land laws, yearn for the producer.

The first Producers' Conference, held eight years ago, passed a resolution asking the Government to set aside areas of land in various districts of the colony as an endowment for possible Agricultural Colleges and State farms in the future. The debate on this important motion suggested that these lands should be vested in a board who should farm and nurse such reserves, and apply the revenues to the purpose of agricultural education of a practical nature. Had this been done, the revenues from the lands so reserved would by this time have been sufficient to have thoroughly well established a training farm for not only immigrants, but young colonials, who with all due deference and much humility, I respectfully suggest, are as much in need of education of this nature as the imported person.

A portion of the Ewlyamartup area, near Katanning, was reserved for the purpose of the old Bureau of Agriculture, having the object of an experimental farm in view, but was surrendered later on and thrown open for settlement. The Department has a reserve at Narrogin of 864 acres, and it has been most favorably reported on by the experts. I am particularly anxious to have a State farm, but do

not want, and would not for a moment countenance, an Agricultural College with its staff of professors. They will come later. A colony like this wants men of muscle. I would have the farm managed in exactly the same manner as if belonged to myself, and I had to make a living out of it—always excepting a small portion set aside annually for the Department for experimental purposes, and out of which money could be only made indirectly—by acquired knowledge. The pupils would have to go into tents, tucker themselves, and go through all the work actually from grubbing and clearing to harvesting, and they would only be asked to pay their tucker bill, with this—and it is an innovation—that if they were found worth it, they would be paid for their labor, and if they were not worth it they would be told that farming was not in their line. The State should not encourage young people to take up occupations unsuitable to them, but the State should encourage the occupation of every citizen. I would like to have a start made this year on this training farm. A very few hundred pounds will be quite enough, and I would like to remove from Western Australia the reproach that it is the only colony in the British Dominions that has, so far as I know, made no provision for the technical training in agriculture for its rising generation.

EXPERIMENTAL PLOTS.

With a view to testing the cereals and grasses grown on the moist land at Drakesbrook, in the drier districts, I made arrangements for plots to be sown, in May last, at Northam, Beverley and Katanning, on land kindly lent for the purpose by Messrs. H. Lukin at Beverley, F. and C. Piesse at Katanning, and H. Throssell at Northam. Some of the wheats were imported from America, but most of them were grown at Drakesbrook. Reports, up to the present show that the American wheats are doing very poorly, while the local wheats are doing well. This is generally the case, but the harvest may tell a different tale. The grasses do not appear, even in the exceptionally wet season we have experienced, to be doing much, and we are not likely to make a success of introduced grasses until we have a farm of our own in a dry district where the seed can be raised and acclimatised, and some attention given to the plants in their early stages. However, a few of the grasses are doing well, but the test will come when the hot, dry weather sets in. It is too soon to judge yet.

DISTRIBUTION OF SEEDS.

In addition to innumerable small packets of grass, fodder and flower seeds being daily sent out by the Government Botanist, a very large number of fairly large samples of wheats, oats, barley, maize, sorghums, potatoes and vegetable seeds, grown at Drakesbrook and imported, have been distributed during the last three months. I hope in this way to bring about the dissemination and cultivation of

new and improved varieties of produce, and to encourage our settlers to go in for experimental work, no matter on how small a scale. So far, speaking generally, they are very apathetic in the matter, but we must keep pegging away in spite of the happy, casual, but to me somewhat trying manners of the recipients of our bounty. The day will come, I hope, when we shall have our experimental plots, conducted by the department, in each of the principal districts of the colony. Half-a-dozen of them and a central farm would do more good than all the preaching in the world, and would cost but little in cash, and would return much to the State in increased production.

DISTRIBUTION OF MALTING BARLEY

You will remember that last spring the Department was enabled to make arrangements with the manager of the Swan Brewery Co. Ltd., to distribute seed barley. I append a report from Mr. Hardwick on the subject:—

“In reply to yours of the 18th inst. During the year 1899, my company distributed seed barley to the extent of 1,057 bushels. The total amount purchased by us—season 1899-1900—has been 11,928 bushels. D. W. Harwood and Byfield & Son, were both buyers, but to what extent I do not know—probably some 3,000 bushels.

As a rule the barley grown was of excellent quality, but much of it was utterly ruined for malting purposes by careless threshing. That portion that had been carefully handled produced excellent malt. I much prefer well managed W.A. barley to either Californian, New Zealand or Tasmanian. This is, of course, provided the season is suitable for development. For the season 1900 we distributed amongst the farmers 572 bushels, only about half of that for 1899. It is to be hoped that they kept some of their own growth for seed, or the quantity available will be small for the coming season.

In addition to the local product my firm imported from California and New Zealand 7,662 bushels.

The experiment of supplying the seed to the farmers has not been altogether satisfactory. When the time comes for payment trouble ensues. They often say, ‘Why charge me more than you will give for my crop,’ forgetting that the seed supplied is the finest barley we can secure, and twice screened.

Faithfully yours,

T. W. HARDWICK.”

HORTICULTURAL WORK.

The Expert reports that during the season eight consignments, of about a dozen cases each, of grapes, apples, pears and oranges were forwarded to the Agent-General, who was kind enough to furnish the Department with detailed reports on the condition in which they arrived, and their suitability for the London market. The reports were of a very encouraging nature, and the experiments demonstrated the feasibility of sending, at little or no risk, large consignments of apples or oranges to England, even under the unfavourable circumstances of a long railway journey to Albany and multiplicity of handling. The experimental consignments of grapes were unsatisfactory, and those of pears partly so. It is only reasonable to assume, however, that, with the mail steamers calling at Fremantle, making a shorter sea voyage and less handling, fresh experiments, if instituted next season, would show that even these more perishable fruits would stand the long sea voyage and transit to England. Another factor to be considered is that during the past season the fruit was forwarded as it came from the growers, without being repacked, and the Expert is of opinion the growers should derive much benefit from the criticisms of the London brokers on their methods of packing.

During the period under review the Expert has attended, chiefly in the capacity of a judge, several autumn shows held by the Royal Agricultural Society in Perth, and by the Nelson Agricultural Society at Bridgetown, where he was also asked to adjudicate in the competition for the best kept orchard. At these shows an opportunity offers of naming fruits for growers who have lost the names in their trees, and also of giving demonstrations in methods of packing fruit.

The following places have been visited by the Expert during the past six months:—Jarrahdale, Bridgetown, York, Bunbury, Ferguson, Boyanup, Capel, Northam, Grass Valley, Darling Range, Pinjarrah, Swan and Armadale. At these places the expert has been engaged in selecting sites suitable for orchards and vineyards for intending settlers, and in giving instructions in planting, summer pruning, grafting, packing fruit, fermenting and handling wine, treating and combating orchard pests, and, generally speaking, in giving information whenever required and practicable, and also offering suggestions, advice and instructions in the cultivation of new crops, plants, etc.

VITICULTURAL WORK.

The following is a brief summary of the work done by this branch during the half-year under notice, and the questions which have occupied attention during the same period:—

Vintage.—The vintage, as regards quantity, did not come up to anticipation, owing to (1) unfavourable weather at time of setting, (2) heat wave later in the season, towards November, when a great many grapes were scorched, (3) *Oidium*, which last season

was more severe than for many years previously. Although the acreage under vines was larger, it is not expected that the yield has been much larger than the previous season. The official figures have not yet been issued by the Registrar-General, but it is estimated that last year's vintage did not exceed 120,000 gallons. At the beginning of vintage the temperature rose to a threatening point for over a week, and as a consequence, considering the wine makers of Western Australia have not yet adopted artificial means of ensuring a cool temperature in their vats, it is not unlikely that some of the wine made during that hot spell, unless carefully handled since, will show indications of unsoundness. The Expert has collected from several of our better managed cellars, "fermentation charts," which he proposes to distribute amongst wine makers every year, and thus get a more precise knowledge of the strength of the must from our grapes in the several vine-growing districts of the colony, at different stages of vintage, as well, also, as a clearer insight into the course of fermentation.

A collection of 25 samples of wine was made for the Commissioners of the Paris Exhibition towards the latter end of last year, and was looked after and cared for at the Government Refrigerating Works for several months. This wine, both red and white, was young, but typical of wine made from Shiraz, Cabernet, Malbeck, Morastel, Riesling and Pedro Ximenes grown in the Swan, Darling Ranges, Toodyay, Katanning, Murray and Armadale districts.

The alcoholic strength of the wines varied from 10.69 to 14.4 of absolute alcohol by weight, which is equivalent to 23 to 31 of proof spirit, the average being 11.6 per cent. of pure alcohol, equal to 25 per cent. proof spirit, which is a degree of strength eminently suitable for wines for the export market. The acidity ranged from .31 to .7, computed as tartaric acid, the average being .4, which is the degree of natural acidity of most Burgundy wines, claret going up as high as .6

The question of the establishment of central cellars, where the grape crops of the smaller growers could be safely and advantageously converted into wine, is every season a burning question towards vintage time. Several schemes have been formulated to meet the requirements of the public, and the matter deserves careful and prompt consideration.

QUARANTINE GROUND AT SUBIACO.

The importation of rooted vines, or vines that have had their roots removed in order to prevent the introduction of the phylloxera, is absolutely prohibited by the Insect Pests Amendment Act, but in order not to restrict the introduction of new varieties, the importation of vine cuttings is allowed from any part of the world subject to disinfection, twelve months' quarantine and disinfection again before leaving the nursery. It is for this purpose the nursery is established at Subiaco, where the cuttings are rooted at a merely nominal cost to the importer. The Department itself

has imported a great number of new varieties from France and California, and these are either in the nursery, or have been disposed of by tender. This year there are a good number of cuttings of varieties already in the colony being rooted for subsequent distribution on the goldfields, as we are continually being asked for vines for experimental purposes, and it is, I consider, wise to encourage this class of culture, wherever possible, on the fields. In addition the nursery is also used as an experimental plot for grasses and fodder plants, with a view to discovering those best suited to cultivation in the sandy lands of our coast. The caretaker of the nursery, I may add, also acts, when required, as an assistant inspector under the Insect Pests Act, so his time is fully occupied.

Referring to the imported vines, rooted at the Quarantine ground at Subiaco, the expert remarks that the "Huasco," which was very highly spoken of in California some three or four years ago, is now said to be equalled in every respect by the Muscat of Alexandria, which flourishes here to perfection. The "Mourisco Preto," also rooted at Subiaco, is one of the most valued of port wine grapes, and imparts to the wine made from its juice the true port aroma and flavour, two characters rarely met in Australian wines of the port type.

DISCOURAGING THE USE OF SECOND-HAND FRUIT CASES.

It is an axiom with intelligent fruit growers that the easiest, most rapid and most effectual way of disseminating insect pests is to use second-hand fruit cases. The passion for using second-hand fruit cases is so general in this colony that I have reluctantly come to the conclusion that the majority of our fruit growers are not—in this respect—intelligent. Thanks to the representations of this Department, new cases in shooks can now be obtained nearly as cheaply as second-hand cases. Freights are reduced on shooks to encourage the use of new cases, and the very slight additional cost is more than repaid by the extra price received for fruit packed in new cases, attractive to the eye of the buyer by their uniformity, and by the possibility of properly grading the fruit, and more than all to the grower, by the loss of risk in bringing a contaminated old case into the orchard. It is a recorded and substantiated fact that the codlin moth was first introduced into New Zealand in cases. A consignment of infested apples was shipped from San Francisco for Auckland. The apples were destroyed, and the cases were sold to help pay the cost of destroying the fruit. The cases were infested and were sent the round of the districts, and the codlin moth was introduced and has been there ever since, and cost the country 60 per cent. of its apple crop—totalling in value thousands of pounds sterling—every year. Here we are free of the codlin moth, but we have the Mediterranean fruit fly. Up to last year this pest was confined to the coast, now we know it is at one place inland. A Perth fruiterer bought the crop of this inland orchard, and sent up second-hand cases to receive the produce. The cases had been previously in an infested orchard, and

the result is the inland orchard is now infested. This means that the department, during the coming season, will have to go through the most distasteful business of destroying the crop of this orchard to prevent the whole district becoming contaminated. It would have been much better to have used new cases, or, at any rate, have taken the precaution of dipping the second-hand cases before allowing them to come into the orchard. This is only a single instance to show how easily disease is spread on account of the stupidity, or greed—usually greed—of the growers, and how easily one of our national industries may be placed in jeopardy.

The last Producers' Conference asked the department to prohibit the use of second-hand cases. The department has not the power without legislative help. The question was submitted to the Advisory Board. The board suggested the Railway Department should not carry second-hand cases unless accompanied by a certificate that they had been disinfected by an officer of the Department of Agriculture, and that a disinfecting chamber should be put up in Perth where cases should be treated. I am informed by the Under Secretary for Railways that "if it is absolutely necessary to carry out the wishes of the Advisory Board the rate-book might be altered to read that returned empty fruit cases will not be accepted for conveyance unless accompanied by a certificate from the Department of Agriculture that they have been duly fumigated." It might be better that freight on shooks should be further reduced, and the freight on second-hand cases made prohibitive. This will pay the railways, as they will get freight on shooks and freight on full cases back, and it will pay the fruitgrowers an hundredfold in the long run. As it is now, there is only a very slight difference in the cost of a new case and a second-hand one, when the freight is considered, and with one there is no risk, while with the other, one infested second-hand case may contaminate and absolutely ruin, not only one orchard, but all the orchards in the neighbourhood.

SHIPMENTS OF FRUIT AND GRAIN TO ENGLAND.

As previously mentioned a number of shipments of apples and citrus fruits, the produce of the colony, have been made during the past six months to the Agent-General, and in all cases the reports of the London experts have been most favourable. About 30 tons of selected wheats, oats and barley, grown in the five chief corn growing districts of the South-west Land Division, were also sent, and were described as the best ever having appeared in London from Australia. We have equally encouraging reports from Paris, and there seems to me to be no doubt, and analyses confirm it, not only our own, but also those made in Philadelphia by totally disinterested persons, that this colony is, *par excellence*, the wheat producer of the group as far as quality is concerned. No doubt a great deal of the praise bestowed is due to the freedom of the samples from weed seeds and other foreign substances. It must be remembered that most of our farmers are

growing their corn now on new, and consequently clean land, but this will not be so long unless stringent measures are taken to prevent the alarmingly rapid spread of noxious weeds. The Department is now preparing further exhibits for the Agent-General, which will be despatched in due course, and I am making provision on the estimates for further shipments of fruit and grain during the coming season. I also sent the Agent-General a large number of views of the cultivated districts of the colony, taken mostly quite recently by the officers of the Department.

INSECT PESTS ACT.

The Chief Inspector, who is also Horticultural and Viticultural Expert, reports:—

Much of my time is taken up in attending to the correspondence relating to this branch. This correspondence consists in answering queries, supplying information on horticultural matters, and furnishing reports on special subjects. Occasional contributions to the JOURNAL of the Department also require attention. Specimens of fruit, insects and fungoid pests and blights, chemicals, have to be examined, identified and reported on. In connection with this work, I wish particularly to acknowledge the valuable assistance readily extended to this department by Mr. D. M'Alpine, the Government Vegetable Pathologist of Victoria, and Mr. A. M. Lea, the Government Entomologist of Tasmania. The want of a specially qualified officer to attend to our entomological collections, and to the work in connection with obscure plant diseases and pests, is most pressing. A good deal of my time, when at the office, is also taken up by interviewers seeking for information.

The administration of the Insect Pests Act takes up a considerable amount of time. It consists in supervising the work and keeping in touch with fourteen inspectors and assistant inspectors appointed under the Act. The San José scale is now well under control. Inspectors have definite and strict instructions to enforce the destruction of trees infested with this scale, and I hope when next I report to be able to declare the country free from this pest. The Mediterranean fruit fly last summer did a good deal of damage to the soft fruit crops within the metropolitan area and along the Swan. The time of the inspectors has, for three or four months, been wholly taken up in trying to prevent the spread of this pest. Three outbreaks in distant districts—York, Bunbury, and Pinjarrah—were stamped out in time. The Department, however, is not receiving from growers the assistance it should. Second-hand cases are, admittedly, the most ready means of distributing pests through our orchards and vineyards.

During the period under review improvements have been made at the disinfecting sheds at Fremantle and at Albany so as to facilitate the quick despatch of imported fruit. Importers now wish to have the fruit brought up to Perth by lighters from the steamers, and disinfected here. This would mean the erection of chambers at

Perth at considerable cost, and also the danger of infesting orchards along the river. I cannot, therefore, recommend that any alteration should be made, unless importers can advance very much better reasons than they have up to date in favor of the change.

The appointment of three resident local inspectors in the chief fruit-growing districts of the colony has given general satisfaction, and greatly facilitated the working of the Insect Pests Amendment Act.

PESTS WE HAVE NOT.

As showing the benefits derived from a careful inspection of imported fruits, and the disinfection of cases, I may mention that this colony is absolutely free from the following serious pests, which levy so heavy a tax upon the orchards and vineyards of the eastern colonies:—Sparrows, starlings, flying foxes, phylloxera, codlin moth, oyster-shell scales, wax scales, pear slug, and apple root borers.

The absence of the above pests, coupled with the wonderful suitability of this colony to the growth of all kinds of fruit, makes this western country a paradise to the grower, and the dissemination of this information should attract the sadly-harrassed and pest-ridden orchardist of the east to follow the sage advice of the late Horace Greeley:—"Young man, go West."

TROPICAL AGRICULTURE.

Again I beg to draw your attention to the advisableness of offering some substantial inducement to persons to cultivate tropical products in the Nor'-West coastal districts. Not only the experts of the department, but others who know the locality, are of opinion that very large areas of this country are well suited to the growth of fruits and edible products now imported into this country from Ceylon, Java, Straits Settlements, Fiji, and elsewhere. The experimental plots of the Beagle Bay Mission, when last reported on, were looking very well, and gave every promise of being most productive. There is an ever increasing demand for tropical fruits here, and especially is this the case with bananas, the importation of which, from Queensland, has for some time been prohibited, for fear of introducing the Queensland fruit fly, a most destructive insect, from which this colony is as yet free. I am inclined to think that it will be necessary for the Government to offer some very direct and substantial inducement to this class of culture, as it must be borne in mind that, when all is said and done, it is experimental, and would involve a considerable outlay and, in case of failure, much loss of time. A bonus might be offered, either in land or money, or, better still, this department might be entrusted with the work, and if successful in its experiments others would soon follow. I believe this would be the cheapest method in the end. The Government Botanist draws attention to the necessity of this department having experimental stations in the Nor'-West. We are continually having seeds of tropical plants sent to us, but have to entrust them to one or two settlers whose efforts, though most laudable, are necessarily of a

perfunctory nature, and consequently the experiments are not of the value they would be if carried out in a more careful and systematic manner. I am causing enquiries to be made all over the tropical and sub-tropical world as to the value of numerous varieties of rubber producing trees, with a view to securing seeds of those most likely to thrive in the Nor'-West. The production of rubber should pay handsomely, and would profitably utilise a vast tract of country at present returning little or nothing to the State or the individual.

I would much like to have experiments made in cotton and tobacco growing in the Nor'-west. I read in the *Tropical Agriculturist* there are 200,000 acres suited to the growth of these crops in Borneo, and I am quite convinced we have soil and climate to make cotton King of the North, but of course, cheap labour is an essential. I know this is a delicate subject to touch upon, and I do not propose to enlarge upon it, beyond remarking that we have possibilities of enormously increased production in our Nor'-west, and that I should much like to have the opportunity given me of showing what can—or perhaps what is quite as important—cannot be done. The world wants cotton and tobacco, and tropical fruits, and if we can grow them, why not? If the experiments I should like to make are successful, the country will be recouped the cost a thousandfold in port dues alone paid by the ships required to take the produce away. Every year I am here gives me a new insight into the immense possibilities of the country, and not to encourage experimental work in order that private enterprise may be induced to follow, is, I consider, little short of criminal.

MINOR INDUSTRIES.

Every effort is being made by the Department, by conferences, and by increased attention to these minor, but important subjects, in the pages of the JOURNAL, to give an impetus to poultry raising and beekeeping, and we are meeting with an encouraging measure of success, judging by the increase in the daily number of enquiries for information. Poultry here, even on new land, appear to suffer from diseases of a fatal nature not met with elsewhere, and I should much like to see the Stock Department take the matter seriously in hand, and issue the result of its investigations in the JOURNAL. We are making every effort to keep down the bee-diseases, and since the Contagious Diseases (Bees') Act was passed, a large number of hives have been inspected, I may add, without any extra cost to the country, as the Expert and inspectors are also inspectors under the Insect Pests' Act and get no extra remuneration for working the Bee Act. A hive of bees has been procured for Rottneest, and it is proposed, in this isolated place, to breed pure queens for sale at low rates to settlers, and thus gradually improve the stocks in the colony, and work out the common bee, which is more prone to disease than the Italian. I am referring under the heading "Pure Food," to the analyses of imported honey, made by this department in the interests of local bee-keepers.

I may add the Department has added several new poultry raising and bee appliances to its museum, and will have these and others exhibited at the various shows which the expert will attend, when they will be explained.

GOVERNMENT REFRIGERATING WORKS.

It was decided, during the half-year under review, that the control of the Government Refrigerating Works should be transferred from the Public Works to this Department. The transfer took place on the 1st of July last. I do not wish to infer that the works were badly planned in the first place, but they appear to have been constructed with a view to more directly encouraging a large wholesale trade, than with the object of facilitating the business of the small men. The ever-continuing desire of this Department is to bring the producer and consumer into closer communication, and as we have more intimate relations with the producer than the Public Works department, I am of opinion this acquisition will help us to attain "our object all sublime." The Dairy Expert of this department has had considerable experience in cool storage in Victoria, and upon his advice, and that of the manager, it was decided to recommend the subdivision of three of the larger rooms in order to encourage the small man. This work has just been completed by the Public Works department, at a cost of about £700, and I am assured that the expenditure will be fully justified by the earnings. It is my desire to run these works as a business concern, and make them, at any rate, pay expenses, but I have no intention of cutting rates or in any way interfering with private enterprise of a like nature. Every encouragement will be offered to customers and particularly the producer, but no undue preference will be given. It appears that in the past, the ice business from these works has been conducted in a fashion that is neither fair to the works nor the recipients of the ice. It has been the practice, so far as I can gather from the manager, to deliver ice to the Public Works' order, not knowing where the ice was going and not getting any credit for it. The Railway Department was also supplied with ice for its cool storage trucks, and of this an account was kept, but the Refrigerating Works were never paid for it, though the Railway Department had a contra account for carriage of coal. This is not a business-like way of doing things. This Department has never received anything for nothing from any other Department—except that of the Government Printer—and I do not propose to give something for nothing. Therefore, I have issued a circular to all departments to the effect that ice will be supplied, for departmental use only, at so much per block, and asking for individual requirements for the coming season. The ice will be supplied to the order of any officer authorised by the head of a department. By this means the Refrigerating Works will be able to take credit at the end of the financial year for the ice so supplied. Under no circumstances will any ice be issued free of charge. It is manifestly unfair to ask me to make ice for nothing for the Railway and other departments, when the works should pay cash monthly to these departments for fares, freight on coal, alterations, repairs, postage, etc. With the alterations and im-

improvements that have been made, I have every confidence in the works, and hope to show at the end of the financial year, that they have at least paid expenses and 5 per cent. on the capital outlay.

It is to be regretted the plant is not duplicated in case of accident, but it is in such excellent order that the possibility of a breakdown is remote. Before I took over the works I had the boilers and engines thoroughly overhauled by an outside mechanical engineer, in whose professional ability I have every confidence, and his report was most satisfactory.

PUBLIC MARKETS.

Having assumed the control of the Refrigerating Works, I regret—and more particularly so in the interests of both producers and consumers alike—there is not a public market in Perth. There is, I am given to understand, a market leased by the Government to the Municipal Council, but it does not by any means fulfil the functions of a public market, in so far as reducing the cost of produce to the consumer is concerned. There is no necessity for a retail market in Perth—shops of all sorts are plentiful enough—but there is an urgent necessity demanding a wholesale market where the hotel-keeper, the restaurateur, the boarding-house-keeper, and even the head of the most modest *menage* can go in the early morning and buy direct from the producer. We are for ever hearing so much about the cost of living. The producer is not living riotously on the proceeds of his sales, neither, so far as I can gather, is the middleman; and yet the consumer complains most lamentably. I am informed that certain by-laws are necessary before produce is compelled to go through the markets. I have consulted the Chief Inspector of Fisheries on the matter of controlling the fish trade, and I would suggest that in the interest of all concerned, if the cost of living in the metropolitan district is to be cheapened, that wholesale markets should be established. It is easy to see how well they would work in with the Cool Storage Chambers. Moderate interest on the capital invested would be earned by the Government, and the cost of living would be reduced to the consumer, with the consequence that population would be attracted and production encouraged. I may add that soil-production is retarded more by the vagaries of the market than by not being able to find a market for one's produce. As matters are now, it is a purely speculative business, and the small man we desire to encourage, cannot afford to speculate.

RURAL INDUSTRIES BILL.

In my annual report to December, 1898, I wrote, *inter alia* :—

“Legislation is required to encourage the manufacturer to convert the products of our lands into marketable commodities. This is particularly necessary in the case of the vine-growers, and unless some very tangible encouragement is extended to them shortly, I entertain great fears for the future of the industry.”

Since the above was written, it has been decided this colony is to enter the Federal Union, and this step makes it all the more necessary that action in the direction indicated above should be taken while our individuality remains.

The Rural Industries Bill, which was designed to give this encouragement and relief, was not presented to Parliament last session, and I am glad to see that the current session will see its provisions discussed. It is a comprehensive measure, and is as applicable to one industry as another, and for this reason should be acceptable. I do not think the producers generally have much to fear from the competition of Eastern States, with one exception, and that is the wine-grower. If the sliding scale is maintained, an opportunity will be given to the people engaged in this industry to become fairly well established before the keen competition likely to emanate from the east sets in. But there is already a tendency, I notice, to amend the tariff in the direction of absolute free-trade between the States, and if this is brought about our local wine-growers must go to the wall. The industry here has already suffered from the mere prospects of Federation, the planting of wine-grapes having been arrested during the past two years. The industry here is in its infancy, vigorous planting having commenced only about six years ago, and it is thus easily seen, freight in this instance being little or no protection, that our vine-growers, with their young vineyards and immature and limited stocks of wines, cannot possibly hope to compete successfully against the old established vineyards and heavy-matured stocks of the east. It must also be borne in mind that the eastern vineyards have received heavy bonuses from the State, and also benefitted and still benefit by cheaper labour. Our vineyards here were planted, as a rule, when labour was dear, on new lands when the cost of clearing and initial expenses were heavy, and not one penny of State encouragement has been received. There was no talk of Federation when the vineyards were planted, and no one contemplated that a cataclysm of this nature would take place. For all these reasons it is only fair that the vine-growers should now receive some tangible recognition by the State. There are three ways in which this may be offered:—(1) As provided by the "Rural Industries Bill," guaranteeing interest on capital, (2) lending money on long terms at a low rate of interest to the growers, as is done by the Agricultural Bank to the ordinary settler, (3) direct gift of money in the form of recompense for losses sustained, and (4) the establishment by the State of central wineries and distilleries for the manufacture of the raw product into a marketable article, and advances on stocks to the producer.

While on this subject I may add the amendment of the "Distillation Act" is urgently needed, and if amended in the direction indicated by the Expert of this department, encouragement will be given to this branch of the industry.

It is generally admitted that of all the colonies this is the most suitable to the growth of the vine, and it seems to me it would be a thousand pities, for the sake of a little assistance, to completely strangle so promising an industry in its early stages.

STORAGE OF PRODUCE.

Agreeable to a resolution of the Producers' Conference, that the Department should make an effort to bring producers and consumers in more direct communication, followed by an emphatic expression of opinion from a representative meeting of farmers held at Northam in December last, it was decided to open sheds in various centres for the reception of produce, in order that such produce might be stored at a merely nominal rate until such time as the owner saw fit to dispose of it. The department issued bond warrants, and it was possible for the owner of the produce to obtain cash advances against the stuff stored. Prior to the inception of this business, the banks and other financial and business institutions had refused to make advances, and the consequence was, that the struggling settler was entirely at the mercy of the merchant. As soon, however, as the department took the matter in hand, the merchants loosened their purse strings, and made advances that tided the settler over the most trying period of his financial year. From a purely commercial point of view, so far as the Department is concerned, the storage business was an absolute failure, but not by reason of any fault of the Department. The opening of the stores compelled the merchants to make the advances they had hitherto refused to make, and so the effort of the department to relieve the glut was quite successful, but not in the manner intended. The intention was to establish the stores for the producer—not the merchant, and the regulations were so liberally framed, that every inducement was offered to the consumer to deal direct with the producer through the stores and avoid the middleman. In spite of the wonderful promises made by farmers to support the stores, so far as I can gather, only two consignments came direct from the farm to the store. The merchants, seeing their opportunity, made advances to the producers, and took advantage of the Department's stores. As this was not your intention when you consented to assist the farmers in this direction, and there appeared to be no likelihood of farmers taking direct advantage of the facilities offered, it was decided to close the stores, and the last one was shut down on 13th June, the first having been opened on January 7th. Stores were opened at Perth, Northam, Coolgardie and Kalgoorlie. Every effort was made to obtain a shed at Menzies, but without result. No buildings were erected by the Department. The Perth and Northam sheds were rented from month to month, the Exhibition building was used at Coolgardie, and I have to record my thanks to the local manager of Millar's Karri and Jarrah Forests Company, Limited, for placing a shed, rent free, at the disposal of the Department at Kalgoorlie. The total cost of the experiment, including travelling expenses and salaries of the officers who were placed in charge of the sheds, and had to be specially engaged for the purpose, was £423 13s. 7d., and the receipts £75 10s. 5d., net expenditure £348 3s. 2d.

The produce stored in the various sheds was as follows:—
 Perth.—Chaff, 10 tons; wheat, 15 tons; oats, 4 tons; potatoes, 1 ton.
 Northam.—Chaff, 100 tons; wheat, 35 tons; guano 74 tons.

Coolgardie.—Chaff, 66 tons. Kalgoorlie.—Chaff, 30 tons; potatoes, 12 tons; onions, $5\frac{1}{2}$ tons; hay (bale), 4 tons. A few cases of fruit and bags of vegetables.

The expenditure, though conducted as cheaply as possible under the circumstances, may be considered by some as having been excessive. But I do not consider it so myself. One must pay for experience; and the result of this experiment—or want of results—proves once again how little reliance there is to be placed upon the word of the farmer. It was stated at the Northam meeting, that if the shed was opened on January 1st—it was opened six days later—10,000 bushels of wheat would be stored in it within a month. The shed was open three months, and during the whole of that period 353 bags of wheat were sent in, and these by a merchant.

The charges were framed on such a basis as, with an ordinary run of business, to show no profit, only mere expenses, yet no sooner had the regulations and fees been made public, than there was an outcry to reduce the charges. Making every allowance for an eccentric season, a shortage in place of surplus, I consider that this is one of the cheapest and most valuable experiments the Department has ever made, because the lesson of it all is, not to attempt it again no matter what clamor may arise.

THE DAIRYING INDUSTRY.

I hear that the Vasse Butter factory has been shut down, and if this is the case it is a great pity, because, with anything like intelligent direction, it had a most unmistakably profitable future before it. It is a great pity to see it lying idle when locally made butter is in such demand.

An effort is now being made to start a cheese factory at Dardanup, or in the neighbourhood, and you will be pleased to know there is every reasonable prospect of its being accomplished. If, however, State assistance is asked for, precautions will have to be taken to prevent a recurrence of the Vasse Butter factory trouble and fiasco, and the money will have to be expended under the direction of this Department. I am quite prepared, with the experienced Dairy Expert we have, to undertake the responsibility.

We have ample evidence to prove that the travelling dairy plant sent round the country last year, in charge of the Dairy Expert, has done a great deal of good in inducing settlers to use better, and more modern appliances, and to adopt better methods in making and marketing their butter. The plant will be again started on its rounds very shortly, and the Expert will deliver lectures wherever required. I may say, in this connection, the Expert recently visited the goldfield centres, with lantern views and descriptive maps of the lands on the coast available for selection. The result of this tour was numerous enquiries, and I am glad to know the good work done by Mr. Crawford is to be followed up by one of the most energetic officers of the Land's Department.

In addition to his other duties, the Expert has spent much time in exhibiting the produce of the Drakesbrook farm at various shows. I think this is time well spent, as it brings before the town-dwellers the immense cultural possibilities of the country.

The numerous enquiries we are constantly receiving as to where to procure dairy stock, evidences the increased interest that is being taken in butter producing. This is an industry that must necessarily hasten slowly, and it should always be borne in mind, by those who draw attention to the large importations of dairy produce, that most of our settlement is of very recent date, and there is much for the settler to do before he can gather round him his flocks and herds, especially in those districts where the native poison plants are found. The scarcity of stock all over Australia is again another factor that is operating against the rapid development of the industry.

ENCOURAGEMENT TO HORSE AND MULE BREEDING.

The war in South Africa has created an unexpected demand for horse flesh, and in referring to this matter I cannot do better than quote a minute I recently addressed to you :—‘It appears to me, having some knowledge of the subject, gained in the Southern States of America, that the breeding of mules should be encouraged here. The hybrid is hardier than the horse and would be easier to rear than its nobler brother on much of our poorer lands. I am also of opinion that the young mules, after weaning, could be trusted to graze over poison country, and that even if they eat some of the poison they would resist it better than the horse, and in time become immune. We have proved by experiment in this direction that animals can be rendered immune, for a considerable period at any rate, by being fed on graduated doses of poison or by subcutaneous injections. The department has imported bulls for the use of settlers, and I am strongly in favour of importing two or three jacks with a view of encouraging, animal for animal, the more profitable mule. If the department had its farm referred to above, the experiment could be tried there at little cost and possibly with much profit. Before giving my suggestions on the encouragement of horse-breeding, I should like to refer to the following extract from the annual report of the Commissioner of Police. The Commissioner says :—“I strongly urge upon the Government the advisableness of establishing a stud farm to breed horses for police work. Although there are in the North numbers of horses fit for the purpose, yet their distance from the central divisions of the colony makes the expenses of purchasing them very heavy, and it is impossible to purchase sufficient suitable animals in the central or southern districts of the colony. I am of opinion that the establishment of a stud farm, as suggested, would prove an economical arrangement.”

Why should not this class of horse be bred on the proposed farm of this Department, and if sufficient capital was invested in entires and brood mares, there is no reason why the police force should not be kept fully equipped from this source with profit alike to the Police Department and the farm.

I now beg to quote my suggestions on the encouragement of horse-breeding for army remounts, as conveyed to you in my minute of the 22nd August. Before doing so, I may add that several illustrated articles on this subject have recently appeared in the official JOURNAL of the department and have given rise to a number of enquiries.

Prior to 1897 the Government contributed annually sums of money to certain racing clubs for the purpose of Queen's plates, with a view to improving the staying powers of horses by means of three-mile races. The West Australian Turf Club continued the race the following year and then abandoned it.

Producers' Conferences of 1898, 1899, and 1900 have passed resolutions asking for this money to be given in the form of special prizes to societies, and further sums to be raised by taxing entires. The latter proposition has been given partial effect to by the preparation of a Bill.

The demand for horses for army purposes is on the increase. Some 12,000 horses have left Australia within the last nine months, and a German buyer is now on his way out wanting 9,000 horses, and English buyers are already here. One reports under date that he can only find 300 horses in the North-West suited to his requirements. This is a very poor showing for so fine a country.

As showing what other countries are doing in this matter, France maintains breeding studs at an annual outlay of £270,000; Austria £140,000; Hungary £116,000; Germany £45,000. The Indian Government has given up horse breeding, but still continues to import stallions whose services are supplied free to selected mares. Three hundred stallions are now kept by the Indian Government for this purpose. The English Government, through the Board of Agriculture, some years ago abolished the Queen's Plates, and now gives the money—£5,000 annually—in fees and prizes to approved horses and mares.

We are nearest the Indian and China markets, and though the horse does not do well in China, there is always a demand, especially now, for breeding on the native pony races and for remount purposes. The Chinese Government has, for centuries, had an excellent plan of encouraging the breeding of horses on the plains of Manchuria and the Tarter steppes.

In asking for State aid to horse breeding I would point out that whatever may be contributed annually will be more than recouped to the State by means of the export trade.

I beg to make the following suggestions for your consideration but before doing so will quote the English practice, as followed by the Board of Agriculture, viz. :—

A number of equal premiums (29) consisting of £150 each, are offered for thoroughbred stallions (four years old and upwards) for England, Wales and Scotland.

Each stallion winning a premium shall serve not less than 50 half-bred mares, if required, during the season, and shall stand or travel at the owner's option in the district for which he is exhibited at a fee not exceeding 40s. for each mare, and 2s. 6d. for the groom.

Stallions shall compete in the district class only for which they are entered, and exhibitors may not enter more than one stallion in each class.

A stallion which has won four Queen's premiums in the same district shall be ineligible for entry again in the same class, but shall be eligible for any other district class.

Any disease shall disqualify the stallion.

I would suggest a modification of the above as being applicable to local conditions :—

That four premiums of £100 each be offered for an approved stallion to stand in each of the four districts of Northam, Beverley, Katanning and Wellington, and that the above rules apply with the following alterations :—

The fee to be 60s. per mare instead of 40s. The stallion to travel the district and serve 50 approved mares. The fee for the groom, which is not customary here, to be abolished. Stallions not to be allowed to travel in one district for more than three seasons, but to be allowed to remove to another district. The owner to be allowed to have the stallion serve a reasonable number of mares at his own fee, but the required number must be served at the Department's fee.

The money to be paid by direction of the Agricultural Department, and all mares to be served at the premium fee to be approved by an officer appointed by the department to carry out that duty.

The total cost of this scheme would be £500 per annum, viz., £400 in premiums and £100 expenses, travelling to inspect mares, advertising, etc.

The money required could be easily raised by a 2½ per cent. tax on the "tote" dividends of the race clubs, and a great deal more in the same manner for equally legitimate and useful purposes.

Condensed Extract from *Sydney Mail*, September 3rd.

A remarkable combination of circumstances has brought about a position in the horse industry of Australia never previously reached. Australian horses have been respected for their dash and staying powers. Practically, Australia has had but one regular customer for her horses. India has absorbed large numbers, but value has been discounted by the high standard demanded, and those who do not come up to the standard have to be sold locally, and often do not fetch the price of service of the stallion, and this has caused the rejection among breeders of high-class sires, and the consequent use of cheap sires. The limited demand for the use of a good sire at a reasonable fee, is such that few men will run the risk of importing a well-bred stallion. It is now found that all along there has been an outlet for the best of the culls if it had been availed of. This class of horse is easily produced in Australia in large numbers.

England and the other great Powers have required thousands of these horses, and have experienced great difficulty in procuring them. The South African war, and subsequent events, have brought about a complete change in the prospects of our horse industry, by creating a demand for Australian horses. Buyers from the British Government, and later, commissioners representing the German Government have purchased heavily in these colonies. It is noteworthy that neither of the Governments demand well-bred upstanding chargers of rare quality, but purchased mounts for mounted infantry, and light and medium gun or artillery horses. Almost all the sales were of the useful sorts, which were formerly bred here in great numbers. Yet the operations of these buyers raised values, all round, about 50 per cent. The main feature was the number of rejects. The buyers were not exacting, a number of horses previously rejected being purchased. The distance from the countries which require the stock is considerable, but the horses can be produced cheaply here, and the purchasing Powers are pretty sure to return for further supplies. Breeders should anticipate this by holding fast to their best mares, using superior sires, and endeavouring to produce saleable stock. Many sound reasoners hold that a tax on stallions is desirable, to scotch the cheap sire bane, and the present position seems to demand such a measure.

In responding to a toast of "The Army and Navy" at a recent show held in England, General Gatacre said that 185,000 horses and ponies had been imported into South Africa, in addition to mules.

Mr. P. Wicken, who has lately joined this Department, reports:—

Shortly before my leaving the Hawkesbury College six mules were obtained from Queensland for work on the farm. They were broken in and worked by the men on the experimental plots, and worked very satisfactorily. They are very good for scarifying, and walk between the rows of plants better than horses. They also stand a hard day's ploughing better than horses. I hear that since I left they are trying to obtain more at the college. Their disadvantage (purely a sympathetic one) is that they never seem to put on condition, or to have a coat like a horse.

From the *Australasian* of September 8th date:—

On the northern stations in South Australia mules have proved a great success. As a proof of their remarkable hardihood, Mr. M. H. Hawker told me that four mules worked all through the drought in one of the firm's northern stations, and kept in good condition, while the horses doing nothing died of starvation. In carting wool to Port Augusta mules were used, and the cost was considerably less than the same work done by horses. Owing to change of water, at every well and spring, horses are apt to scour, and in a drought they soon succumb when suffering from scouring. The water has no effect on the mules.

TAX ON ENTIRETS AND BULLS.

In response to the expressed wishes of the last three Producers' Conferences, a Bill has been prepared for submission to the current session of Parliament, providing for the imposition of a tax on entire horses and bulls. The Bill has for its objects the minimising of the evils of the brumby entire, and the scrubber bull, a perpetual menace to the breeder of good stock. It is to be hoped this measure will meet with the approval of Parliament, and that the tax will be made sufficiently heavy to render the existence of these worthless animals impossible.

In an article by "Bruni," in the *Australasian*, September 15th, he says :—

The reason why worthless sires are used in horsebreeding is mainly because of their cheapness, and to impose a tax on stallions will do away with many sires of an inferior grade, and will have a tendency to raise the fee for those that are left. The improvement of the breed of horses has for years past been carefully studied by most Continental nations, and particularly by France and Germany, and the plan that has given the best results is to provide high-class stallions for the use of horse breeders at a low fee to mares that have passed the inspection of Government officers appointed for the purpose. The inspection of mares could be carried out as on the Continent.

DEMAND FOR STOCK.

When this Department first imported pedigreed dairy bulls, it was largely jeered at, those who have most benefited since went out of their way to make nasty remarks, but it is very consolatory to know, that they who came to scoff have remained to pray. The trouble is now not to suppress the scoffers, but to supply the reasonable demands for the bulls. Three Jerseys and two Dexter Kerrys are all the department possesses, and, of course, every one wants them at once. If the Department had a farm, it would be easy to breed and rear stud stock, breeding from these bulls, and bring up the best of the calves. The Victorian, New South Wales, and South Australian Departments of Agriculture make money this way, why should not the West Australian? Comparatively little capital is required. A Shorthorn bull is to be purchased for the Kojonup district, and an Ayrshire for the Meckering settlers. The Northampton people have been offered the use of a bull, and when they decide to accept, the Jersey now at Greenough will be transferred. I have recommended to you that in order to keep the supply of bulls going in the most economical way, the Department should purchase the progeny of pure bred cows. The cost of rearing would be infinitely less than buying imported stock.

The above remarks on cattle breeding at the State farm apply equally to all classes of stock. There is always a demand for high-class stud animals.

With your permission, arrangements are now being made for the keeping of a few stud pigs at the Drakesbrook Experimental Plot, an additional five acres having been recently reserved for the purpose, the clearing is in hand and the fencing will shortly be done. There will be enough refuse from the place to feed the pigs for ten months in the year. Two Tamworth sows are being secured from Victoria to arrive in November, in pig, and a boar from the Hawkesbury College, New South Wales. Orders are already being booked for the progeny, and I anticipate a rapid sale, and that the enterprise will show a handsome profit.

SUBSIDIES TO AGRICULTURAL SOCIETIES.

The manner in which Government grants are given to agricultural and kindred societies urgently needs amendment. The last two Producers' Conferences have urged the distribution of the grants on a basis of £ for £, and the last Conference was most

emphatic in expressing the opinion that the subsidies should be paid through this department. I find upon investigation that out of a total of sixty active societies registered with this Department, only thirty, or one half, have ever received Government aid. The returns also show that the Government subsidy bears no proportion to the membership, prize money or activity of societies, and is proved by the following instances:—

Society.	Prize money.	Government subsidy.
Great Southern P. & A. Society ...	£225 0 0	£25 0 0
Beverley Society	81 11 0	50 0 0
Darling Range Society	12 1 0	15 0 0
Greenough Society	95 2 6	75 0 0
Geraldton Society	148 10 0	25 0 0
York Society	133 12 9	25 0 0

In this sort of distribution of Government grants there is no encouragement to the more active societies. Many of the most vigorous societies are getting nothing at all, while the most useless are getting grants proportionate only to their uselessness.

Last year the societies of the colony gave a total of £2,574 13s. 7d. in prize money, and the Government subsidies amounted, according to a return furnished by the Treasury, to £855, including £75 to Dog and Poultry Societies not enumerated on our lists, and a discrepancy of £5, or a net total to Agricultural societies of £775.

I think a subsidy of £ for £ is rather too high, and that 10s. in the £ actually paid in prizes during the previous year is sufficient. On the returns of last year, if this suggestion is given effect to, the cost would stand thus:—

Prize money paid last year	... £2,574 13 7
Subsidy at the rate of 10s. in the £	... .. £1,287 6 9½
20s. Subsidy paid last year	... .. 855 0 0
Increase	... .. £432 6 9½

An excess vote is impossible, as the money is paid on *last year's* prize money. If a new society starts it must have had a show the previous year before being entitled to a subsidy. The amount of the subsidy will be known exactly every year before the estimates are prepared.

The advantages of this system will be:—

- (a) Societies receive in proportion to individual activity.
- (b) Influence is left out of the matter.
- (c) The knowledge that, now a small grant is likely to be forthcoming on formation, and prior to any useful work being done, brings about the multiplication of small and ænemic societies, which live only to draw the annual grant and do nothing in return.

Precautions would be taken to have the prize schedules approved by the Department, in order to prevent money being offered for mountebank shows not connected with agriculture.

PRODUCERS' CONFERENCE.

The Eighth Annual Conference of Producers was held under the auspices of this Department in May last, and was quite as successful as any of its predecessors. The business was of a most varied nature, the resolutions embracing almost all branches of agronomy. It is worth recording, as showing the improving tone of the conferences, that resolutions of a purely parochial nature were almost, if not entirely absent from the agenda paper this year. It is evident the producers are realising the force, advantages and necessity of working together as a whole, if they are to become a powerful body and secure the recognition they are justly entitled to, but have not been always able to command. This year, for the first time, the department has had to bear the cost of conveying the delegates to and from Perth, the Commissioner for Railways having declined, as hitherto, to issue free passes. It will, therefore, be necessary to provide money on the Estimates for the coming Conference in 1901.

In addition to the above meeting, a Conference of Bee-keepers was held, with a view to putting the industry on a more satisfactory footing. Some little spirit at first prevailed amongst those present to use the machinery provided for securing a monopoly, but the folly of attempting this was soon made apparent, and now those interested are working in harmony with the Department.

A Conference of Poultry-keepers was also held under the auspices of this department, and practical demonstrations in caponising were given by Mr. H. Nathan, and excited much interest. The Conference, no doubt, did much to bring poultry-keepers together, and infuse new life into this important industry.

NATIONAL SHOW.

In introducing this subject I cannot do better than quote your original minute to me making this admirable suggestion as follows:—

“I notice, from a minute by the Secretary of the Department of Agriculture, that the Advisory Board is to meet on the 11th inst., and shall be glad if Mr. Cowen will bring before them the suggestion I made at the last Conference of Producers to the effect that next year we should have, in connection with the Conference, a sort of National Show.

My idea is that each district should be invited to bring forward a collection of local products to be exhibited, not in the name of the individual but that of the district, that the Government should carry the exhibits free of charge, and give every assistance in displaying same, that the show should be held in the Town Hall, and a small sum charged for admission, that small prizes be given from the proceeds derived from the charge for admission, if thought advisable, and in addition, that the department should offer one or two champion cups for award to those districts displaying the best exhibit.

If something could be arranged on the above lines, I think a spirit of rivalry would be called forth, and, moreover, visitors to the city would assuredly have an opportunity—never before offered to them—of seeing what the different districts of the colony were capable of producing. Hitherto all the shows of fruit and soil products that I have seen either at the Royal Show or in the country districts—have failed in adequately representing what the colony is producing, and I believe, if Mr. Cowen will take this suggestion up with his usual good sense and enthusiasm, we should secure a show that would silence our traducers, and be such an object lesson as has never before been possible in the colony."

The Advisory Board, I may say, cordially endorsed your suggestion, and, acting upon your instructions, a prize schedule has been prepared, which, though differing somewhat in detail, has met with your approval, and has been circulated freely in the hope that this enterprise will meet with the success it deserves and give effect to your patriotic desires.

PARIS EXHIBITION.

The preparation of agronomic exhibits for the Paris Exhibition occupied more time and attention on the part of the officers of this department than one would imagine or the Commission is ever likely to give us credit for. It is generally believed we have only to ask of the producer and it will be given. Such is not the case, and the exhibits had to be actually collected by the officers of this department, and very little was spontaneously forthcoming, except from the business men, in response to our appeals. It is satisfactory to know that exhibits forwarded by this department to Paris have met with approval, and particularly in the case with our cereals, a very gratifying letter having been received from the President. A great many of the exhibits were grown at Drakesbrook by the department especially for the purpose, and I take the opportunity of recording the valuable work done by Mr. Berthoud, the officer in charge of the experimental plot. I endeavoured to impress upon the Commission the necessity of regular fortnightly shipments of fresh fruits and produce to the Exhibition, but I appealed in vain. I am given to understand the colony is to be represented at Glasgow, and if this is the case, I hope, if the department is expected to contribute its quota, to know definitely, as soon as possible, and that ample funds will be forthcoming. One cannot collect, classify, pack and despatch exhibits of this nature unless ample time and money is at one's disposal. The department, of course, cannot spare anything from its annual appropriation for this purpose.

NOXIOUS WEEDS.

I regret to have to report that after five years' endeavour we are still no nearer workable legislation in the matter of preventing the introduction and spread of noxious weeds. As you are aware the only Act in existence refers exclusively to two weeds known as the

Spanish radish and the Scotch thistle. The former is prevalent in the Swan and eastern districts, but its eradication is not difficult, and there is a marked decrease since so much crop has been cut early, before the plants seed, for hay. This is one advantage that has been derived from the demand for a green sample of chaff. The true Scotch thistle, referred to in the Act, is seldom found here, though there are many other varieties. Consequently the Act is quite useless, especially when it is considered that some hundreds of varieties of weeds, many of infinitely greater danger to the pastoralist and farmer, are known not only to exist here, but to be spreading at an alarming rate, and over these the Department has no power. If steps are not taken promptly, the stinkwort promises to become as great a pest here as it is in South Australia. The Bathurst burr has been found in different places from Fremantle to Coolgardie in the east, and to Albany in the south. The Bill prepared by me for submission to last year's Parliament was withdrawn, and now the Amended Bill has been prepared. This received the approval of the Advisory Board, and in the interests of all concerned will, I hope, meet with the approval of Parliament. Its provisions are by no means stringent, not nearly as stringent as I should like. It provides for local option in the declaration of weeds, *i.e.*, the Roads' Board has the power to recommend, to the Governor-in-Council, that a certain plant should be declared a weed in its particular district. But if the local body takes no action, the plant is not a weed. I have very little confidence in the local bodies in matters of this kind, as, generally speaking, the members are the greatest sinners and naturally hesitate in bringing down the penalties provided by legislation upon themselves. A plant may be declared a weed in one district and may not be a weed in adjoining districts, unless action is taken to have it declared so. The Advisory Board was unanimously of opinion that the administration of the Act should be in the hands of this department, and not left to local bodies, but, of course, the department could not act unless the local body has previously set the initiative. I do not think any, or if any, very little, additional expense would be entailed, as the inspectors under the Insect Pests' Act, who are always travelling about, could be made weed inspectors also. I can assure you, Sir, the weed question is assuming alarming proportions, and I trust Parliament will recognise the gravity of the situation, and pass an amending Act this session. The expenditure of a few hundred pounds during the next few years may ultimately save the country the loss of thousands. This is the experience of the Eastern States.

BOTANICAL.

During the half-year under review the Government Botanist has done a good deal of practical work in attending to the herbarium, and in the identification and reporting on native and introduced plants sent to the Department. Reports on specific subjects, for this and other Government Departments, for settlers in different

districts of the colony, and for correspondents in various parts of the world. Among these subjects were included garden plants suited to saline and inundated ground at Perth racecourse, those best adapted for planting in the Coolgardie district, the cultivation of saltbushes, weeds growing in the sands at Fremantle, cultivation of lavender, dill, samphire, the gum of *Nuytsia*—the flame or Christmas tree—rubber producing trees, *Eucommia*, *Kickxia*, and others. Recommendations were also made, at the request of correspondents of the department, on the fodder and soil binding plants most suitable for cultivation in dry districts in North China and British Columbia. Seeds have been received from the Drakesbrook Experimental Farm, as usual, including those of ornamental, vegetable, forage and other useful plants. Pods of *Galega persica* were obtained from Mr. Stanbury, and others have been received from a few regular correspondents in the colony. From beyond the colony we have procured seeds of saltbushes and other plants from South Australia, of *Pentzia virgata* from Mr. MacOwen, Government Botanist of Cape Colony, of the *Kickxia* rubber tree from the Aburi Botanic Gardens, Gold Coast, West Africa, while from Taiping were received cuttings of seeds of tapioca plants, arrowroot, patchouli and tamarind. Distributions of these have been made to the various public gardens, orphanages, etc., in the colony, and to private individuals at their own request, or with a request from the department that they would give them a trial. But while a number may be found to undertake their cultivation in the temperate latitudes of the colony, a difficulty has been experienced in placing tropical seeds or plants for experimental cultivation, under suitable conditions, in the far North. There is no botanic garden for the cultivation under glass, and there is no experimental garden for their open air growth in the tropical portion of the colony. Many of the so-called luxuries of civilised life are derived from the tropics, and the consumption of these is extending so rapidly that before long they will be classed among the necessities, even among poor people. If, therefore, the colony is to claim credit for developing its own resources, or take part in the wealth-producing distribution of tropical products, it is high time that provision was made for the experimental cultivation of tropical seeds and plants as a preliminary to their introduction as a profit-yielding industry.

Seeds of various ornamental and useful Australian plants have been forwarded to Tangiers, Austria, Bavaria, North China, Edinburgh and Kew.

The germination test of seeds has been applied to many of those that have passed through the department.

A few simple experiments were made on the poisonous actions of two of the reputed poisonous plants of the colony. One of these, *Oxylobium retusum*, var., (*O. graniticum*, S. Moore), that had poisoned a number of camels near Coolgardie, was found to have retained its virulence after many months dessication and to speedily kill

rats and guinea-pigs that drank of an infusion of it. The other, *Gastrolobium villosum*, which had been blamed for causing the death of 400 sheep in one night, was found, so far as the small supply of the shrub went, to give negative results. It is possible that if the sheep had eaten greedily of a luxuriant growth of the plant, especially after being used to dry and scanty food, they may have died from Tympanitis. Whether this may prove to be so or not, the question is of sufficient importance to call for definite settlement, and the season has just arrived when the plant is commencing to open its flowers.

Articles on various subjects of interest to the farming community have been contributed by the Botanist to the JOURNAL of the department, and, as it appears to be considered part of the routine duties of the Government Botanist, mention may also be made of an article on the vegetation of Western Australia written for the West Australian Year Book for 1898-1899, recently published.

Herbarium. Although a little is always being done in arranging and identifying the specimens, time has not been found to do much systematically in that direction, especially as the deficient supply of books of reference occasions a great loss of time. A parcel of specimens was forwarded to Sydney Botanic Gardens as partial return for those we have already received from that source, but as this duty of exchanging specimens can only follow the arrangement of the *Herbarium*, it must obviously be slow and gradual, especially under existing circumstances. A century of specimens was offered to Mr. MacOwen, Government Botanist of Cape Colony, who had expressed a desire to extend his acquaintance with our West Australian flora. A small collection of mounted specimens of native plants was also prepared and forwarded to the Paris Exhibition.

A few of the desired books were recently obtained from Melbourne and Sydney, but the most important standard works have still to be procured, presumably from London. Those hitherto requisitioned have been only the foundation, or the skeleton of a working library, and many others are necessary, but have not been asked for till primary needs were first supplied.

PURE FOOD.

While it may be desirable in the interests of the consuming public to reduce the cost of living as much as possible, compatible with a fair measure of profit to the producer, it is very necessary that every attention should be paid to securing pure food. We live in an age of adulteration. This Department has done good work in the past in checking the importation of adulterated products, notably in the case of Victorian butter, and later on, in the matter of the metropolitan milk supply. Latterly, investigations have been made by the chemist into the quality of the honey imported, with a view to assisting the local producer and protecting the

local consumer. I am glad to be able to report, that so far, all the imported brands that have been analysed have been found to be most excellent honey, nearly, if not quite equal to the locally produced article. Believing that pure food is of more importance to the community than cheap food, I am asking for slightly increased provision on the estimates this year in order to pursue this important branch of our investigations. With a Central Board of Health, multifarious local boards, and so many municipalities scattered about the country, one would not think it would be necessary to refer to even the possibility of diseased meat and contaminated milk being vended in cities and towns. Yet I regret to have to draw your attention to the fact that many of the dairies in the country districts visited by the Expert of this Department are reported to be in a most abominably filthy state. Very few precautions are taken to prevent the sale of diseased meat. Stock diseases are more prevalent here than one would think, and it is very important that the sale of diseased meat, and contaminated milk, should be arrested. Some little time ago, it will be remembered, the Expert of this Department made a statement about the number of diseased poultry—suffering mostly from diphtheric roup—being offered for sale in the local markets. The statement was pooh-poohed, but investigation proved he was right. While this has really nothing to do with this Department, one cannot see the public being fed on diseased food, without drawing attention to the want of supervision and regular inspection of slaughter houses, butchers' shops, markets and dairies. Money spent on procuring pure food for the people is better than money spent on hospitals and cemeteries. We want live people here, not dead. A corpse is no use except to fertilize the cypress at the head of the grave. The abolition of private slaughter houses, the establishing of public abattoirs, the regular inspection of dairies town and country, the maintenance of public wholesale markets and municipal bye-laws compelling food supplies to pass through the markets, are the apparently somewhat drastic, but only proved and sure remedies.

THE ARTIFICIAL FERTILIZER QUESTION.

This Department has been the means of checking adulteration in many forms, but I regret to state ample evidence is continually forthcoming that the sale of adulterated and worthless artificial manures is on the increase. In 1895 I drafted, and Parliament was good enough to assent to, the Feed Stuffs and Fertilizers Act. This Act is quite sufficient if put into operation to protect the purchaser of manures against fraud. But the doctrine of self-preservation evidently does not appeal to the buyers of artificial manures, and I have yet to hear of the first prosecution under the Act, and though we have gathered together in the office analytical evidence enough to make half the vendors of fertilizers in the colony amenable to the Act. It is not for the Department to take action, but the person who may think he is being victimised. A resolu-

tion was carried at the last Conference, which, stripped of its verbiage, shows there is a tendency on the part of the buyers of fertilizers to add one more objectionable duty to the Department's daily routine, that of hunting out and prosecuting vendors of adulterated manures and foodstuffs. What with the administration of Insect Pests and other Acts, we have quite enough unpleasant work, and if the person who buys manures, with the Act at his back, cannot protect himself against fraud, I do not think the Department need take any further interest in his misfortunes.

I have recommended that the fees for analyses should be reduced, and this you have kindly assented to. Beyond this I am not prepared to go. I should much like to see the manufacture of manures locally established. There is a local output of bonedust but it is not nearly sufficient to supply the demand. At the last Producers' Conference a resolution was passed "That in the opinion of this Conference it is desirable that the Government should be urged to offer bonuses or some other substantial form of encouragement for the production of artificial manures in the colony." With manures manufactured on the spot adulteration could be more easily checked.

The Victorian Government is offering a reward for the discovery of mineral manures in that colony. Acting on your suggestion I opened up correspondence with the Agricultural Analyst and the Geological Department with a view to ascertaining if deposits were likely to be discovered in this colony. The following report by the Agricultural Analyst is of sufficient interest to receive publicity.

MINERAL MANURES.

"Mineral manures are the several native phosphates of lime found in large quantities in a great many parts of the world. They are principally the coprolites or tricalcic phosphates found in the sedimentary rocks. Apatite or Fluro-phosphate of lime and Chloro-phosphate of lime, found in the older Laurentian rocks. Apatite is much richer in phosphoric acid than Coprolites, and is the principal mineral manure imported into England, of which she takes about 600,000 tons per annum, independent of what is found in England. Only the richest samples, from 60 to 90 per cent. of phosphate of lime are imported into England. The mineral phosphates are not used in the raw state, but for making superphosphates, which have almost entirely replaced dissolved bones. Although superphosphate is not as good a manure as dissolved bones, as far as the phosphates are concerned, and a much richer manure can be made from mineral phosphates. Mineral phosphates, being much cheaper than bones, easier, and at a lower cost, worked into superphosphates, which are sold at a much lower price than dissolved bones. The higher percentage of phosphate in superphosphates, and the low price at which they are sold, has created the enormous demand for them in England, Europe, and America.

VICTORIAN REWARD FOR NEW DISCOVERY OF MINERAL MANURES.

That colony has up to the present time only a small known supply of mineral phosphates within its boundaries, and, of a low percentage of phosphoric acid, is naturally only able to supply a limited quantity of superphosphate, but with new supplies of mineral phosphate containing a higher percentage of phosphoric acid the manufacturers would make a much larger output at a much cheaper price. Naturally towards that end they are anxious to obtain new supplies.

MINERAL PHOSPHATES IN WESTERN AUSTRALIA.

Coprolites have been found in this colony, but so far little or nothing has been done to develop the deposits and show whether they are of any extent or not. Within the last three years a good many samples of supposed mineral phosphates have been brought to me, but in most cases they have no resemblance to phosphatic minerals, and contain little or no phosphoric acid. As to whether it is worth while offering a reward for the discovery of a deposit of mineral phosphate, I will leave to the consideration of the Hon. the Minister for Lands. It would certainly be not only a good thing for this colony, but greatly to its advantage to have a deposit or deposits of mineral phosphates, either to manufacture into superphosphates or to export for the same purpose.

In working these deposits great care has to be taken, as they are generally associated with substances which, if allowed to be mixed into the samples in too great a proportion, will reduce a higher percentage of phosphate to a value lower than one of a low percentage of phosphates. A large quantity of the Coprolites is obtained from river beds, and old water courses, such as that found in the Carolinas U.S.A., and sold in the market under the name of Carolina phosphates. In Western Australia I expect the phosphates will be found in these old water-courses. At the present time a great many of these old courses are hidden under the arenaceous deposits, where there will be some difficulty in finding them. When one deposit is found, others will be more easily discovered by following the course of these old river beds.

What is most likely to be found is the Coprolites in the sedimentary formations. In fact, the samples of mineral phosphates (from private sources) brought to me were Coprolites, and got mostly from somewhere beyond Guildford. The parties who brought them were not inclined to give any information as to the locality.

The Government Geologist on the matter being referred to him replied :—

“ Phosphates may possibly be found associated with the crystalline schists and other metamorphic rocks which form such a prominent feature in the colony. A glance at the 1894 Geological Map will show the area over which these beds extend.”

Arrangements are now being made for the Geological Department to assist us, and I think it would be wise for the Government to offer some encouragement to private individuals to endeavour to discover these deposits. Their value to the country, if sufficiently extensive, would be incalculable.

DRAINING THE LOW-LYING LANDS OF THE SOUTH-WEST.

I should like to draw your attention to the very evident necessity of inaugurating a national scheme of draining the low-lying and particularly fertile lands—when drained—of the south-west. Even in the very driest districts of the colony, draining is desirable, for it is well known the better land is drained, the more the moisture is retained in the soil, and consequently the greater its productiveness. We have, I know, had an exceptionally wet winter, but in ordinary seasons production is much harrassed in the south-west by the lodgement of water. The State, I urge, should make the main channels at the public expense. If this is done the settlers will soon make the subsidiary channels. As matters stand now, the

settlers can do little more in the winter months than grow water-cress, and fervently hope to become web-footed. With adequate drainage the potato crop of the colony should be increased twenty-fold.

JUDGING AT SHOWS.

Applications are continually being made to the Department for the Expert officers to act as judges at shows. This is discouraged for obvious reasons, though it is very difficult sometimes to avoid giving consent. The officers attend the shows as much as possible, and are instructed to give all the information and advice that may be required, but only to act as judges when it may appear to them to be really in the interests of the society to do so. Here, as elsewhere, the judging at shows leaves much to be desired. The Department has done its best to assist societies in asking each one to nominate competent judges from its own district who are willing to travel to other districts and act as judges. The question of travelling allowances appears to be the sticking point. It is hardly fair to expect anyone to undertake the very thankless office of judge and pay for the doubtful privilege. I should like to see the societies better subsidised on the following conditions:—Revised schedules; larger prizes in important classes; single judges; paid judges and judging by points. Attention to these items are, I think, more important and more calculated to increase the utility of shows than the annually recurring efforts at amalgamation.

The Nelson Agricultural Society has for years given prizes for the best kept farm, orchard, garden in the district. I should much like to see this laudable example followed by other societies, and the Government give substantial encouragement, as is given in New South Wales, to the practice. In these competitions the officers of this Department are only too pleased to act as judges, and both the Viticultural Expert and myself have had the honour of being called upon on several occasions to officiate. At the request of the Nelson Society the Horticultural Expert is now engaged in revising the scale of points previously used in judging, and I hope this, one of the most active of our societies in well-doing, will also see fit to revise the garden and farm scales before the next competitions take place.

GOOD ROADS.

The Departments of Agriculture of the United States and Canada pay particular attention to the road question, having divisions especially devoted to this purpose. Bulletins are frequently issued on road construction, and the settlers of the countries mentioned are being by this and other means continually impressed with the necessity of having good roads, and the advantages to be derived therefrom. Much as I appreciate the value of good roads to the producer, I do not wish to assume the responsibility of controlling the roads and bridges expenditure,

but I wish for the third time to call attention to urging upon Roads Boards the desirableness, when a section of road is to be made, of making it well, and, after it is made, of maintaining it in proper order. The cost of haulage is a very serious item to the producer, and any possible reduction in this is a saving apparently, I much regret to say, more honoured in the breach than the observance. Increasing the width of tires on drays and waggons, and the introduction of the Victorian system of local government, where engineers are employed by shire councils to make roads, and not as here, persons without any experience whatever, would I think not only reduce the public expenditure but give our producers better roads, and consequently a very much diminished haulage cost.

THE DOG QUESTION.

I cannot conclude this report without referring to that favourite subject of the American humorist the "yaller" dog. Whether the alleged humorist or the present subject of the alleged humor is the more objectionable, I am not prepared to argue, but we have ample and most disastrous evidence to prove that locally the "yaller" dog, the cur, is, in spite of recent amendments of the Dog Act, levying a very heavy tax upon the flocks of the colony. I again take the opportunity of urging a further amendment of the Act so as to make the use of discs compulsory, and after a certain date in each year that rewards should be offered for the destruction of all dogs without discs attached to their collars, the sign of registration and ownership. If a dog is worth keeping, it should be worth registering. The Producers' Conferences year after year have asked for an increase in the reward for dingoes' tails, and as the legislation governing the domestic cur, and the number of dogs kept by natives is practically inoperative, it is easily seen the dog nuisance is on the increase.

IN CONCLUSION.

SIR,

I wish to record my appreciation of the assistance rendered to this Department by the other Departments of the State, and to tender my thanks to those Departments of a kindred nature, to numerous learned societies, to the proprietors of many publications and correspondents generally in other parts of the world who have rendered gratuitous service to this Department. I have to thank you for your ever vigilant interest in our welfare, and finally beg to assure you that the officers, one and all, like yourself, are animated by the common desire to advance the interests and particularly the practical utility of the Department.

I have the honor to be, Sir,

Your obedient Servant,

L. LINDLEY COWEN.

Secretary.



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NOTES.

TESTING MILK.—Mr. A. Crawford, the Dairy Expert to the Department of Agriculture, reports during a recent visit to the South-West district having tested 21 cows at Mr. A. Clyton's, Alversbroke, Brunswick, and obtained the high average for the herd of 4.6 per cent. of butter fat.

NEW ZEALAND WHEATS.—The Secretary Department of Agriculture has received from New Zealand 29 samples of wheat from the Agricultural Department of that colony; these samples are now on view in the Museum of this Department, and are open for the inspection of anyone interested in the matter. The New Zealand Department will supply this wheat at 5s. per bushel f.o.b. Wellington.

The Shorthorn bull recently bought by the Department of Agriculture from Mr. McKenzie Grant, of Newmarracarra (a descriptive article of this estate appears in another part of this JOURNAL), has been sent to Kojonup. He has been named "*Pride of Argyle*," and was calved on January 10th, 1899. His pedigree is as follows:—

SIRE—By "PRIDE OF THE LAKE"—Sire Kirklevington Count 2nd, by Baron Graham (41030), dam Countess of Count Levington 2nd, by Oxford Beau, grand dam Countess of Levington, by Lord of the Isles (34631).

DAM—"CAMPBELL HOUSE QUEEN" (imp.), bred by T. R. Bowman, Esq., of Campbell Park, South Australia, and descended from the well-known "Canowie Herd," and noted M over 7 brand.

WAGIN PROSPECTS.—Mr. R. Gell, Wagin, writes: I am pretty well certain that the area to be cut for hay and harvested for wheat will be less than last year; notwithstanding that a number of new settlers have come and located themselves on the land, the quantity they have got in will not compensate for the very large areas left out on the old holdings, the heavy and persistent rains experienced this winter made the ground so boggy, even early in the season, that it became an impossibility for those having large areas cleared to in any case complete their seeding, practically there was only five weeks in which operations could be carried on successfully outside this period, the ground was either too hard or too soft. As to the condition of the crops, they are in a very backward state, and a large portion of them are very sickly looking owing to the continual wet; in almost every crop considerable patches of varying size are quite drowned out and destroyed. I do not think that either the wheat or hay averages will come up to last year, it is yet too early to make a forecast of the return, as it is impossible to say what a few weeks of mild genial weather may do.

FEEDING PIGS.—It seems to go against the grain with many of the farmers here to feed good grain to pigs or poultry, or when they do, it is doled out in such meagre quantities that it does not pay. At the price of wheat in the early part of this season, or even at present current rates, feeding wheat intelligently to pigs will pay quite as well, or better than selling to the miller; provided a good breed of pigs are kept. One of the largest bacon curers in Australia has offered to erect and equip a factory on the most modern principles if he can be guaranteed 300 pigs per week. This ought not to be a very difficult matter, as there are many districts where, in a very short time, that number or double it could be supplied if the settlers would only make up their minds to do so.

THE VARIEGATED COMFREY.—Several years ago *The R.N.-Y.* expended much energy in exploding the Prickly-comfrey boom, and demonstrating the fact that this coarse and vigorous perennial was not a practical forage plant in the land of the maize or Indian corn. We hear nothing about comfrey now, though one individual grew it and fed it to his horses for many years, as described in later issues of the paper. *Symphytum aspernum aureo-variegatum*, which may well be shortened to Variegated comfrey, proves, however, to be a most useful and desirable addition to our hardy ornamental border plants. A fine specimen received from H. A. Dreer, of Philadelphia, Pa., is growing now in the Rural Grounds. It forms a large rosette of gold-margined foliage close to the ground during the greater part of the season. Later the stems and leaves rise and form a large plant with many drooping, bell-shaped, reddish-blue flowers over all. The Variegated comfrey endures the heat of midsummer better than any other golden-variegated plant grown on the Rural Grounds.—*Rural New Yorker*.

A NEW FRUIT.—At a meeting of the Royal Agricultural Society held in August (reports the *Times*) a fruit was exhibited for the first time which bids fair to become very useful. From a botanical point of view also it is of considerable interest, the plant bearing it being a hybrid between the raspberry and the common blackberry. As the "Mahdi," as it has been called, was raised by Messrs. Veitch, its origin is well authenticated, the seed parent being a variety of the raspberry known as "Belle de Fontenay." The same cannot be said for the Logan berry trailing from the other side of the Atlantic, for which a somewhat similar parentage has been claimed. A high authority, however, is of opinion that the raspberry plays no part in its composition, and that both its parents were an American species of *Rubus* instead of only one. The "Mahdi" has very much the habit of the blackberry, and in cultivation it is trained in the same way. Its fruit recalls to some extent the dewberry of our hedges. There is the same bloom, but the number of fruitlets is greater. Careful scrutiny will reveal

many intermediate characters; the taste of the berry combines a predominant flavour of the dewberry with a suspicion of that of the raspberry. Most important is the time of fruiting as regards the future of the plant economically, for it comes into bearing as the raspberries are falling, and before the blackberries are ripe. The "Mahdi" is very prolific, and has considerable claims to be a decorative plant; it will not, however, be placed upon the market for probably another 12 months at least.

KEEPING TEST FOR APPLES.—In a report to the Secretary for Agriculture on the keeping qualities of apples, Mr. A. Despeissis, Viticultural and Horticultural Expert, writes:—"The Minister will be interested to see this specimen of the Cleopatra apple, taken at random amongst some apples from Mr. Charles Harper's orchard at Woodbridge, and picked on March 20th last. A few days later some of these apples were sent to the Agent-General in London, and were favourably reported on by the fruit brokers there. This particular apple has just been picked over six months, and has received no special care whatever. It has simply been put away in a cupboard without wrapping round it, and in a room exposed to every change of temperature. Had it received the ordinary attention given to fruit stored for long periods it would have looked even fresher."

THE USE OF SORGHUMS.—The use of the sorghums as forage plants is rapidly increasing in all countries which are semi-arid or subject to frequent long summer droughts. As the use of the plant increases there is an increasing desire to use it as pasture, but there is a reluctance to do so from the fact that there has sometimes been a loss of stock fed upon the growing plant which could not be accounted for upon the theory that death was caused by ordinary bloat. While these cases have been rare, yet they have occurred, and the cause is not yet known. The Nebraska Experiment Station has been thorough in its investigations, but so far has learned nothing. Samples of sorghum which had killed a cow within a few minutes after eating it disclosed no trace of any poisonous substance when analysed a few days later. The station authorities are forced to conclude that sorghum sometimes, when growing or freshly cut, contains poison which soon disappears in the process of curing, so that by the time the samples reach the laboratory and are analysed they are harmless. There is at any rate no danger in feeding cured sorghum, and a great deal of sorghum is pastured with no injurious results, and yet the fact that deaths, not from bloat, have sometimes occurred from its use makes it an undesirable pasture crop until we know more about it. It is suggested by the station authorities that in cases where poisonous effects followed its use the plant itself was probably unhealthy and yellow, but there are not sufficient data on that point to justify a very strong opinion.—*Weekly Chronicle*.

SHEEP.

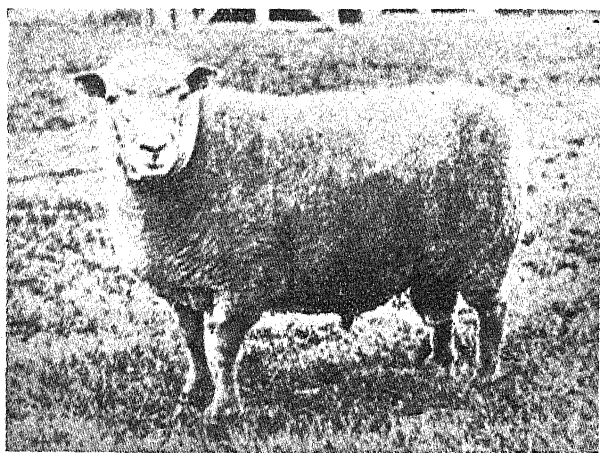
BY PERCY G. WICKEN.

Continued from page 120.

LINCOLN SHEEP.—These sheep come next to Merinos in importance, little is known of the origin of this breed, but they are supposed to be indigenous to county Lincoln, and they are said to be the original of all long wool breeds of sheep. Great attention has been devoted to the improvement of the Lincolns, much of the coarseness has been alienated, and they are now more symmetrical; the old Lincoln was a huge, ungainly animal, standing on high boney legs, large coarse carcase and a tendency to lay on fat on the rump and not mixed with the flesh. These old breeds have now disappeared, and the present Lincoln does not stand so high on his legs, the carcase is still large, weighing from 120 to 150 lbs. The shoulder is very forward, neck thick, and large deep julap, face and legs perfectly white, with a tuft of wool on the face and no horns, wool very long, producing very heavy fleeces, ranging from 12 to 25 lbs. in best animals, hoggets wool has been known to reach 15 inches in length. Lincolns were first imported into the colonies about the same time as Merinos, the Van Dieman's Land Co. were extensive importers about the year 1810. Some grand fleeces have been got from special animals of the best Lincoln stud flocks of Australasia, as much as 30 lbs. in the grease having been shorn from a ram, the wool being of exactly twelve months' growth. A Victorian Lincoln flock has averaged from fifty ewes, sixteen pounds to the fleece. The care and knowledge with which certain of the best Australian Lincoln flocks have been selected, and the great length of time which they have had to acclimatise themselves, gives sufficient guarantee that the conditions necessary for success in this part of the world have been fulfilled. The Lincoln ram is invaluable for crossing with the Merino ewe for the purpose of producing a good crossbred sheep, it is better for this purpose to use young Merino ewes, than to use old ones, as the percentage of loss in lambing is not so great. It is best to allow the ewe to have one lamb by a Merino ram before putting her to the Lincoln. Some breeders advise using Merino ewes that have been cast for age, but are otherwise sound. It should be remembered that the Lincoln is by nature not at all a sheep adapted for roughing it, and on this account the crossbreds need far more attention, both as regards feed and water, than the Merino. The Lincoln is a breed that has been raised in one of the richest parts of England, where food and water are abundant and the soil rich, they require much more feed than the Merino and will not yield a profitable return on poor country. The Australian farmer ought to make no mistake about breeding from the Lincoln. If he is not prepared to treat them well he need not attempt to keep either pure Lincolns or any

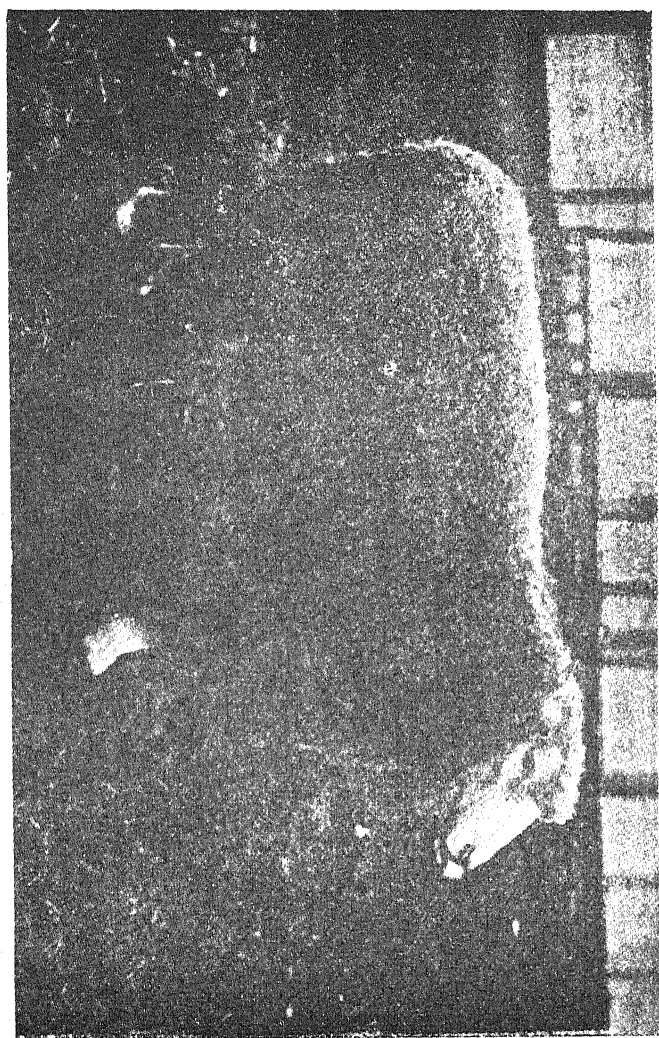


LINCOLN RAM.



SOUTHDOWN RAM.

DEVON LONG-WOOLED RAM



cross from this breed. The illustration shows a champion Lincoln ram which took first and champion prize at York and Nottinghamshire shows in England last July, and was sold for one thousand guineas.

THE BORDER LEICESTER is a sheep of modern type, and is supposed to have been produced by crossing Bakewell's celebrated Leicester with the Cheviot sheep. The Border Leicesters do not feed so rapidly as the Improved Leicesters, but they are more hardy, stronger in constitution, more suitable, and adapt themselves better to differences of soil and climate. The leading points of the Border Leicesters are : head large, standing well up, wide nostrils, face white, eyes full, bright and bold looking, chest deep, back straight, well developed rump, well sprung rib, legs white, strong, and rather long, sometimes deficient hind quarters, the mutton has an excellent flavour, and good sheep weigh from 100 to 120 lbs. The wool is sound, and fetches a good price, but is not so dense and lustrous as the Lincoln.

THE IMPROVED LEICESTER.—Robert Bakewell devoted his life to improving this breed ; about the middle of last century he commenced to improve the native sheep of that county, his system was to put the best to the best irrespective of relationship, he selected the best sheep of the county breed, but did not cross. After a number of years, during which time he did not make much headway, his efforts began to be appreciated, and in 1779 he received £1,200 for the hire of three rams for one season, £2,000 for seven others, and £3,000 for the balance ; he thus netted £6,200 in one season for the hire of rams.

No other breed of sheep possess such great aptitude to fatten and are ready for the butcher so soon. Improved Leicesters have been used to improve all the long woolled sheep in Great Britain.

The leading points differ from the Border Leicester, viz. :—Head small, eyes mild, full and prominent, ears thin, long and fine, face white, back perfectly straight from head to rump, breast broad and well forward, legs short and wide apart, stands close to the ground, good barrel, shoulder round and thick, weighing from 100 to 130 lbs., abundance of external fat. The wool is fine and very crimped, fleece weighs on an average 8 to 12 lbs.

They do very well when fed on turnips and other root crops, and large numbers are kept in New Zealand and fattened on turnips for the London market.

As regards the rules for the breeding of crossbreds from the Leicester ram with the Merino ewe. By getting well-constituted ewes of four years old or over, that have been cast for age, but are in

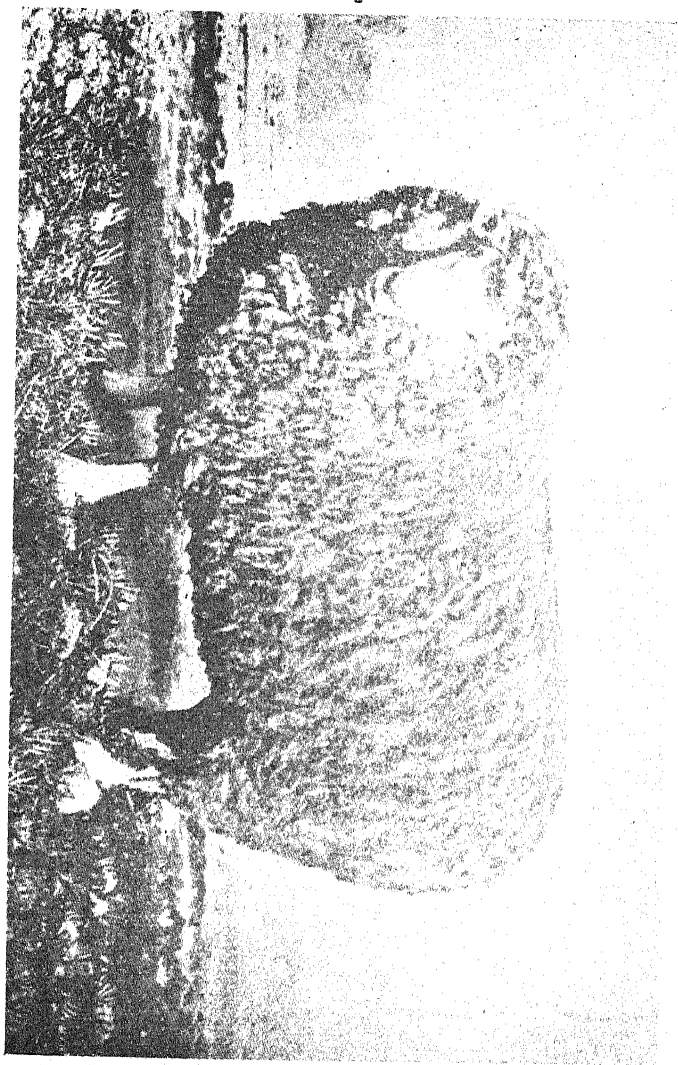
other respects sound, and mating them with the Leicester ram, the sheep farmer will have a sound cross for the first generation of progeny, and he may then go on to mate his crossbred ewes with the Leicester ram a second, and even a third time. It is then time to stop, for some of the qualities of the Leicester begin to assert themselves too exclusively, and those as a general rule are not its best qualities. The result is a sort of "come back" on the Leicester side, which has neither the good mutton of the pure Leicester or the good wool and hardiness of the pure Merino.

THE COTSWOLD SHEEP are the largest domesticated sheep in the world, they are indigenous to the Cotswold Hills in Gloucester. They are named, according to one authority, from the cots or sheds in which they were housed at night, and the wolds or open hilly country on which they pastured during the summer. They have large frames and heavy fleece, the flesh is rather open and coarse, but the fat well mixed; they make more mutton on the same quantity of food than any other breed, the ewes are very prolific. They are rather stately looking animals, and there is a good demand for them in America, and in New Zealand. The wool is very long but rather open, much coarser in fibre than either the Leicester or the Lincoln, the face white, sometimes mottled, ears very small for size of sheep, neck long and thick, legs white and rather short, head very wide across the forehead, eyes prominent and full, and face covered with wool. The head is carried high and the whole animal has a majestic style. The wool demands about the same price as the Leicester. The Cotswold sheep make a good cross for the Down sheep for early lambs of good size.

THE CHEVIOT SHEEP.—Bred on the Cheviot Hills in the northern counties of England, they are a distinct breed of sheep. Sir John Sinclair, a well known authority, said they were perfect in form and fleece. They have no horns, face and legs white, eyes small and prominent, very lively, body and legs both long, wool close and fine. They are exceedingly hardy, they have been known to be buried in the snow for 13 days and then to have recovered, they will travel long distances, the mutton is sweet and delicate, and they possess considerable fattening qualities. Several of these sheep have been imported for the mountain country in Gippsland, Victoria.

THE HIGHLAND BLACKFACED SHEEP.—It is generally thought that they are the native sheep of the Highlands of Scotland, the influence of climate is well shown, as the sheep is completely covered with wool, which is of an inferior quality, the peculiar adaptability of this breed is to stand a severe climate, and to fatten on the coarsest herbage. Many attempts have been made to cross this breed, but have proved unsuccessful.

ROMNEY MARSH I.A.M.



THE DORSET SHEEP resemble the Merino more than any other British breed, both ewes and rams have horns, they are very prolific breeders, and lamb very early in the season. The face and legs are white, the face is long and broad, and there is a tuft of wool on the forehead, the shoulders are low but broad, the legs rather beyond a moderate length, and the bone small. They are, as their form would indicate, a hardy and useful breed, the mutton is well flavoured and they mature quickly. This is a breed of sheep which might be introduced with great advantage for the purpose of raising early lambs for market.

LONG-WOOLED DEVON SHEEP.—Resembles the Lincoln, originated in Devon. They are not quite as large as the Lincoln, are coarser-boned, and do not show so much breeding; face white, and lock of wool on the forehead, and wool comes well round on the cheeks. They have recently been improved by crossing with the Leicester.

THE ROMNEY MARSH SHEEP.—Celebrated for being able to stand the evil effects of grazing on wet, low-lying marshy land, are very free from foot-rot or fluke. Romney Marsh is on the south coast of Kent, England, and is nearly level with the sea, from which it was reclaimed. This breed is distinguished by thickness and length of head, a broad forehead with a tuft of wool upon it, a long and thick neck and carcase. They are flat-sided, have a sharp chine, and are tolerably wide on the loin, have the breast narrow and not deep, and the fore-quarter not heavy or full. They have much internal fat, and are favourites with the butcher. They are very hardy, they bear cold and exposure well, and require no extra feeding in bad winters. The great advantage of these sheep is, they are not subject to foot-rot. Probably there is no breed of sheep which at the present time in New Zealand can give a better record for general usefulness than the Romney. Of course, we except the Merino for dry country, but in all the country where crossbred or half-bred sheep will live, it would be very hard to find a sheep that adapts itself better to its surroundings than the Romney Marsh and its crosses. That Romneys are suitable for heavy lands is perfectly true, for they will withstand foot-rot and other complaints which sheep on wet land are prone to, better than any other breed. But this is not their only merit, where they excel is in constitution, and it is this robustness of constitution which enables them not only to withstand the usual evil effects of wet land, but enables them to transmit to their offspring the power of withstanding droughts.

SOUTH DOWN SHEEP.—This breed has hardly a rival in the quality of mutton, it is in style and appearance unique, head small and hornless, covered with wool, face and legs black or brown, fine expression, the eye is large and mild, gentle, but full of life, ears

small, breast wide, back perfectly level, legs short, ribs well rounded, fine large carcass, wool in some of the best sheep is soft, close and elastic, fibre exceedingly fine, it is a medium wool between Lincoln and Merinos. South Down rams put to Merino ewes give very good lambs for an early market.

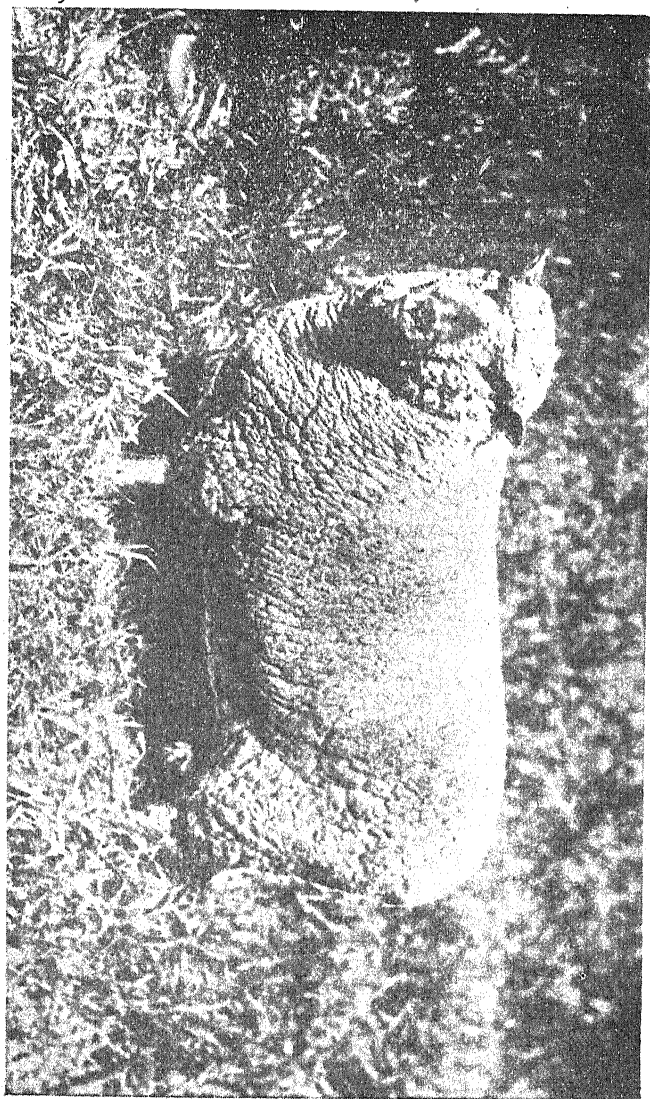
HAMPSHIRE DOWN SHEEP.—Owe their origin to county Hampshire. It is about a century ago since they originated. Previously, they were a heavy-boned and ungainly looking sheep. They are not nearly so symmetrical as the South Down. Leading points are :—Big in the bone, large head, Roman nose, faces and legs black, ears much larger than South Downs and more pointed, make heavy weights at an early age. Yield of wool is small compared to size, weighing 6 to 8lbs. per fleece; it is of excellent quality. Mutton is of good quality, and they are extensively used, same as South Downs, for getting fat lambs for market.

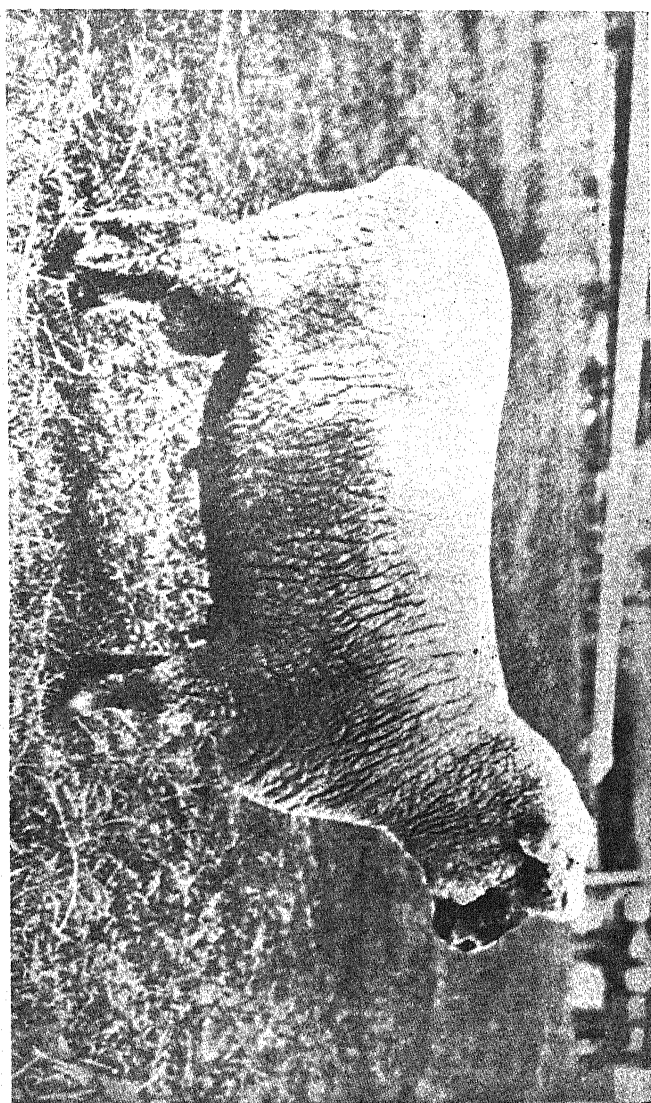
SHROPSHIRE DOWN SHEEP.—Remarkable for adapting themselves to soil and climate. They originated in Shropshire, but are popular all over England, the Colonies, the United States and South America. They are largely used in all parts for crossing with the merino. Leading points are : Face and legs of a soft black, well developed head, clean and striking expression, no horns, body deep and squarely set on fore-legs, wool is of a fine staple, splendid quality, short and close. They fatten very rapidly and produce excellent mutton. The ewes are good mothers, very prolific and hardy, and are remarkable for getting fat on coarse herbage.

OXFORD DOWN SHEEP.—Is quite a modern sheep. It was brought into existence by crossing the Hampshire with the Cotswold, and they have been developed with great enterprise and judgment, and are now recognised as a distinct breed. They like a rich soil, they are a hardy breed, mature early, produce excellent mutton of superior quality, the wool is close and fine, the ewes are excellent mothers and very prolific. Leading points are : Head small, tuft of wool on forehead, deep well-rounded body, usual black legs and face.

SUFFOLK DOWN SHEEP.—Now recognised as a distinct breed and possesses a flock book. It is a cross between the old Norfolk breed and the South Down. Suffolk Down mutton is in great favor in the London market, and often realizes the highest price. Leading points are : Hornless, face and legs black, clean white tuft of wool on forehead, ears black, eyes bright and prominent, shoulder broad, chest deep, ribs remarkably well sprung, full flank, fine long level back, wool is of good staple, fine and without any tendency to mat, the skin is fine, soft and remarkable for pink rosy color.

SHROPSHIRE DOWN RAM





OXFORD DOWN RAM.

BLACK-WOOL MERINOS.—Mr. Allen, of Braeside, Queensland, has been for some years past breeding a flock of black Merino sheep. He noticed that, in spite of drastic culling, black sheep occurred in all flocks, and was struck with the idea that possibly sheep were originally black. To test this theory he put black Merino sires to black Merino ewes, and found that right from the initiation the experiment was a complete success, the lambs being all black. At one time Mr. Allen had 2,000 black merinos in his flock. Very high prices have been obtained for the wool. In 1886 Mr. Allen showed at the Colonial Exhibition in London, a bale of black ewes' wool of seventy fleeces, weight 2 cwt. 3 qrs. 17 lbs. The sheep had been fed on natural grasses only, the wool realised 1s. 6½d. per lb. in the grease.

Mr. J. Baylis, of Narrandera, New South Wales, also has a flock of black merinos, and has never known a lame sheep; they are very hardy and free from foot rot. Mr. R. A. Warden of Milton, on the South coast of New South Wales, who could not keep white Merinos for foot rot, bought some of these sheep, and after keeping them for two years he says:—

"The test of two years, the last six months of which has been about the wettest ever experienced, I should think, and the perfect immunity from any kind of complaint, is quite sufficient to pronounce the black sheep as suitable for the coast district. I have no hesitation in saying that had they been ordinary white Merino sheep, not one would have been free from foot rot. I propose getting another black Merino ram so that I can improve the small flock."

BROAD-TAILED SHEEP OF KURDISTAN.—The most striking characteristic of this breed is the immense broad tail, equal to about $\frac{1}{3}$ the weight of the body. The tail is a mass of fat and serves as a reserve stock of food in time of drought. The rams have no horns. The lambs at birth are black, changing later on to the long yellowish white wool of the mature sheep. The value of this breed is for crossing with the finer woolled varieties upon which the effect is marked. A number of the experimental stations in the United States have imported some of this breed for the purposes of crossing with their own sheep, and the results obtained have been very encouraging, and it is thought at these stations that the Persian sheep is destined to play an important part in the future history of sheep raising.

(To be continued).

POTATO SCAB.—A proclamation has been issued by the Department of Agriculture, New South Wales, proclaiming the potato scab (*Oospora Scabies*) to be a disease within the meaning of the "Vegetation Diseases Act," and thereby prohibiting the importation of potatoes affected with scab into that colony.

SOIL BACTERIA.

(From *Agricultural Gazette* of New South Wales.)

R. HELMS.

The discovery of the important part played by certain bacteria within the soil in converting nitrogenous substances into nitric acid, in which form plants assimilate one of their most important food-stuffs, has created a clearer conception of the processes by which such chemical changes are brought about. This, together with the discovery that certain plants by means of similar minute organisms in their roots can utilise the nitrogen of the atmosphere, has opened out new vistas to scientific agriculture.

Besides these oxidising organisms a number of others occur extensively, which act in the reverse manner by reducing nitric acid to ammonia, or even to nitrogen, and thereby play, on the whole, an even more important part in the economy of nature, although in many instances their action is the reverse of beneficial to plant life. These are known as reducing or denitrifying organisms in contradistinction to the first mentioned, which have been named nitrifying bacteria.

Anything we can do to increase the development of the nitrifying bacteria, or to design methods for checking the too rapid multiplication of the reducing organisms, will, at the same time, be the means of increasing the fertility of the soil, improving those soils that are poor, and maintaining the productiveness of more fertile ones, since of all the factors on which the fruitfulness of land depends, the power of nitrification is undoubtedly the most important.

Investigations with this aim in view, carried on during late years in the greater number of countries where agriculture is pursued according to advanced principles and with modern appliances, have led to promising results, and these researches, together with the better understanding of the value of manures, are beginning to produce a revolution in the theory and practice of agronomy.

Since the functions of these organisms are considerably affected by their surroundings, and they behave differently in different soils and climates, these differences may prove to be very pronounced in Australia where both soil and climate are so extremely variable and peculiar. It is therefore not possible to accept as conclusive the results obtained by investigators in other countries, and it becomes necessary to study their behaviour under local conditions.

Before further discussing the different groups of soil bacteria and dwelling upon their characteristics, it is desirable to sketch the history of their discovery in an epitomised form, and to present the results hitherto obtained by different investigators.

HISTORICAL.

As far back as 1862, Pasteur surmised that nitrification in soil was due to micro-organisms. Up to his epoch-making investigations, fermentations were considered to be the result of purely chemical reaction, and it was but natural that after proving the important part played by the yeast organisms, he should go so far as to consider other phenomena involving complex chemical changes as being connected with similar microbes.

Schloessing and Müntz proved in 1878 that the action of minute organisms caused nitrification, or the transformation of ammonium salts into nitrates and nitrates by oxidation. This fact was confirmed by Warrington in the same year. A definite knowledge of the specific organisms producing the alteration of nitrous compounds were, however, not obtained.

Heraeus was the first who, in 1886, applied the modern methods of bacteriological research to this subject. He claims to have obtained positive results. By means of elaborate investigations on a large number of bacteria obtained from soil, water, and air he managed to produce pure cultures. Among them he credited four distinct bacilli with nitrifying power.

Frank soon after made lengthy investigations on bacteria isolated from several kinds of soil, and obtained entirely negative results. In consequence, he disputed the vital process in connection with nitrification.

This conclusion was rebutted by Plath and Baumann in 1887.

Celli and Marino Zucco in the meantime had experimented with five micrococci isolated from the highly nitrated water of Rome, but did not succeed in proving that any of these were the specially qualified nitrifying organisms.

Warrington examined, in 1888, a large number of bacteria obtained from soil for their nitrifying power without arriving at the desired result; but when, instead of his pure cultures, he took ordinary soil for seeding his food media with, he always succeeded in inducing nitrification. These researches led him to the conclusion that the specific organisms had yet to be found.

Further, Percy Frankland and Grace Frankland have paid attention to this important question. Although they experimented with twelve different organisms isolated from soil, the result was in every case a negative one; but, as with Warrington, when using a little of the soil from which the organisms had been obtained, nitrification was readily excited in the culture fluids.

As these many experiments of such able bacteriologists failed to prove a definite nitrifying organism, the results of Schloessing and Müntz were attacked anew, and it was again doubted whether organisms played any part at all in nitrification.

At this stage the famous Winogradsky, of Zurich, took the question up, and by his masterly handling of the subject produced definite and important results.

From the experience gained by experimenting with such a large number of different organisms during several years, and by the foremost bacteriologists, it had become apparent that those capable of introducing nitrification could not be numerous, and that probably only one or two might exclusively possess this characteristic. It had, moreover, become plain to him that the organism in question did not thrive on the ordinary nutrient media composed of organic substances in general use for the official cultivation of pathogenic and other microbes. Winogradsky very ingeniously took advantage of this peculiarity. By showing ordinary gelatine plates with cultures derived from various soil-bacteria, he induced a vigorous growth of species that flourished in this medium, and then grafted in suitable fluids from the spots which showed no development. Thus he succeeded in separating the nitrifying organisms. Further discussion of the methods of manipulation is needless, but he ultimately proved a somewhat oval-shaped organism to be possessed of the characteristic power to nitrify ammonium salts.

The puzzle was solved at last, and led to more definite studies being continued by Winogradsky and others. The technique of bacteriology had meanwhile been enriched by the clever invention of Kuhne, who provided a solid culture medium free from organic substances by gelatinising silica. This allowed of reliable work being done in a more rapid manner.

Several species, or may be varieties, of nitrate-producing organisms have been detected in soils from different parts of the globe, and it seems fairly certain that nitrifying organisms are universally distributed and found in most soils, but are present in greatest number in fertile areas. Less is known of the nitrate-forming organisms, and it is surmised by some that these may possibly be a modified stage, so to say, of the former.

From experiments made in laboratories it has been ascertained that in cultures seeded with soil the development of nitrites precedes that of nitrates. Thus ammonia is first converted into nitrous acid, and this latter into nitric acid.

This has led to the conclusion that two physiologically distinct organisms are required to accomplish the transformation of ammonia into nitrates. Winogradsky is of this opinion, and claims to have separated the nitrate-forming microbe.

He has proposed for the group of nitrifying organisms the name of *Nitrobacteria*, giving the generic term *Nitrosomonas* to the nitrates-forming types, and *Nitrobacter* to those who transform nitrites into nitrates.

NITROGEN-FIXING BACTERIA.

Besides the nitrifying bacteria which are able to transform ammonium salts found naturally in soil, or have been added thereto, into other nitrogenous compounds, a number of related organisms are met with in many fields which have the power of utilising the free nitrogen of the atmosphere and drawing from this vast store of almost inert gas considerable quantities for plant-food. These are the nitrogen-fixing bacteria.

On the rootlets of many higher plants, more especially on those of the *Leguminosæ*, small nodules in varying numbers are found produced by and filled with bacteria. It is supposed that by the *symbiosis* (a living together) of these lowest forms of plant-life with the higher plants, the latter derive the nitrogenous food which it is proved cannot have been derived from the soil, and therefore must have been obtained from the atmosphere. The process is not yet properly understood, but the general opinion tends towards the assumption that the bacteria fix the free nitrogen within the nodules and that the resulting nitrogenous compounds are assimilated by the host-plant. By some also it is thought that through the peculiar conditions of "living together" the plant is enabled to fix free nitrogen in its foliage.

Whatever may be the correct theory, the effect of this remarkable interaction between the lower forms and the higher plants is very striking and very variable in extent. Even amongst the *Leguminosæ*, the plants deriving the greatest advantage from this phenomenon, extremes are met with; some deriving apparently but little benefit from it, whilst on the other hand many may very largely depend upon it. Amongst the Lupines, for instance, the yellow flowering variety is able to entirely dispense with nitrogenous substances in the soil.

Through the exhaustive investigations made first by Professors Hellriegel and Willfarth, and later by Lawes, Gilbert, and others, on nearly all the cultivated leguminous plants, no doubt has been left that the nodules found on the roots are formed through bacteria, and that these are able to fix free nitrogen for the use of the plant they attach themselves to. Until Hellriegel proved that the presence of bacteria is necessary to enable plants to utilise the nitrogen of the atmosphere, and that, for this reason, *Leguminosæ* may almost entirely dispense with nitrogenous manuring of the soil they grow upon, and in many instances even enrich the land with nitrogen, these observed facts were not properly understood.

It is well known in practice that clover and lucerne would grow vigorously for a period of years without being manured, and when flagging could often be invigorated by a dressing with gypsum.

This tends to prove that these crops did not sicken for the want of nitrogenous food, but on account of other elements becoming exhausted or unobtainable for some reason from the soil.

A palpable proof that the help of bacteria is almost absolutely necessary to enable plants to assimilate atmospheric nitrogen, is afforded by the fact that seedlings, say, of peas, will not thrive unless the soil contains at least some traces of nitrogenous compounds; but as soon as they have made a start and have sent out rootlets upon which the bacteria can form colonies, they prosper independently of the presence of this food in the soil.

During the experiments carried on in several German agricultural establishments it was discovered that every species of legumes was associated with a specially sympathetic bacterium which would not perform the office of fixing nitrogen for other species. Based upon the acquisition of this knowledge, Professor Nobbe, of Tharand, in Saxony, is now preparing a number of pure cultures of these specific bacteria for the purpose of sowing them together with their respective culture plants. These cultures are placed on the market under the name of *Nitragin*, and for some time have been undergoing and still undergo practical tests regarding the efficacy of promoting the growth of plants.

It has not been definitely ascertained how long these artificial cultures can retain their vitality unimpaired; and, besides, in some instances, adverse seasons have prevented a definite judgment being arrived at as yet, whether the results obtained in trial plots can be maintained on a larger scale in the field. Considerable attention is being paid to this question at the agricultural stations in Germany as well as in the United States and elsewhere.

THE DENITRIFYING BACTERIA.

In addition to the organisms hitherto referred to, all of which are pre-eminently friendly to plant-life, and thus indirectly to man, there are a host of other bacteria met with in soil and water which play an important part in connection with agriculture.

Their action is to reduce the compound organic substances into less complex combinations, or into simple elements, and in this manner make them again available for plants to which otherwise they would be lost, as these can utilise nothing but elements or simple compounds for their nutrition.

It is manifest that were it not for the decomposition of the many complex substances taken from the earth in the shape of plants and animals, after these have changed from the active state called life to that of inactivity or death, and by this process are redissolved periodically, these substances would be entirely lost to succeeding

generations of plants and animals, and this constant drain from the resources now found on the surface of the globe would ultimately exhaust their supply and make life impossible.

That putrefaction and other processes of decompositions are produced by bacteria was suspected for a considerable time, but it was not definitely proved till 1875 by Menzel, and subsequently verified by others. The action of these organisms is so variable that in the decomposition of any given substance probably a dozen species participate.

From this indisputable achievement of scientific research it will be seen that it is in the first instance entirely due to the activity of the minutest organisms that what is of earth goes back to it again by the dissolution into simpler substances of the complex and intricate combinations. Chemical action, no doubt, has also much to do with the redissolution; but it is now accepted that this activity in the generality of instances is secondary to the bacterial, and takes place after these have broken up the compounds.

Without the one process the other would not take place, and from this it is evident that micro-organisms are more closely connected with the productiveness of the soil than was dreamt of less than thirty years ago, and that not only in medicine and industrial pursuits, but also from an agronomic point of view bacteriology is becoming daily of greater importance.

The organisms intimately connected with the fertility of the soil may conveniently be divided into two groups, namely, assimilating and destructive bacteria.

Under the first group we would classify the nitrifying and the nitrogen-fixing bacteria; and in the second all species which cause putrefaction and decomposition may be included.

The first group, as previously stated, includes nothing but beneficial species which are occupied either in building up nitrogenous compounds in the soil—the nitrifying species—or in fixing nitrogen from the atmosphere—the nitrogen-fixing bacteria—the latter of which, besides assisting plants to use this element, frequently also enrich the soil itself.

Important as is the numerous second group on account of the reducing power of its species, it includes several that act disadvantageously in regard to agriculture.

These objectionable species are the denitrifying organisms. By denitrification is understood the deoxidation of nitrates and nitrites, which in each case involves a loss by either nitrogen or ammonia being given off. Their activity is perceptible by the pungent smell of ammonia rising from fresh stable manure, particularly from that of horses. Nitrogen being odourless, its loss cannot be perceived by the senses; it nevertheless takes place to some extent during every process of decomposition where nitrogenous compounds are present.

THE AIMS OF SOIL BACTERIOLOGY.

It now remains to indicate the aims of Bacteriology in connection with agriculture. These are shortly as follows :—

1. To encourage a definite multiplication of the nitrifying organisms found already in the fields, by adding substances that will enable them to retain their vitality and vigour after their activity ceases for the want of nitrogenous material ; and in case of their absence from a soil to transplant them thereto, if this can conveniently be done, by adding soil impregnated with the desired bacteria.
2. To secure by the growth of plants favourable to nitrogen-fixing organisms an enrichment of the soil by nitrogenous compounds ; and
3. To counteract the sudden and excessive development of the denitrifying organisms, in order to prevent loss of fertilising substances by means of these latter.

POULTRY ON THE FARM.

BY A. CRAWFORD.

In last month's JOURNAL the hatching of chickens under hens was dealt with, but to the modern poultry-keeper this is an out of date practice, and he finds it more economical to use an artificial incubator, so that he can have his chickens when he wants them, and can rear them better and stronger than with a hen.

It is a very common thing to hear incubators run down and said to be useless, not reliable, not to be depended upon, and so on. Well, there is a certain amount of truth in all that when speaking of incubators as a whole. There are incubators and incubators. One kind that breeds oaths and swear words and anethemas deep, if not loud, noxious smells from rotten eggs, young blow-flies and vermin of many and various kinds ; these are the kind best left alone. The other sort breeds young ducks and chickens, smiles and good humour, and is not more expensive than the first kind, sometimes not nearly so much so. Because some persons have been so unfortunate as to get the first kind of machine, it is no reason they should cry artificial incubators down. With a really good first-class up-to-date machine better results can be obtained than by setting the eggs under hens. Most people like to hatch their chickens early, and many want to raise from 100 to 200 in the season, that means having from 10 to 16 or 17 hens setting. These have all to be looked after, fed, watered, if covered up, taken off

their nests and seen safely on again, if not covered, there is the chance and probability of other hens going into the nests and laying and fighting with the sitters, and breaking the eggs, and every now and then some of the hens will desert their eggs, and at length one comes to realise the poultry-keeper's life is not a happy one. Under the modern system this daily worry is not existent. The incubator sits in a room in or near the house, the eggs are placed in a drawer and turned every day, the lamp is filled and trimmed once a day, and if it is a good machine, that is all there is to do until the chickens come out, except see that the water tanks for keeping the air moist are kept full. Many good machines will hatch time after time from 90 to 100 per cent. of fertile eggs. After the eggs have been in the incubator for seven days they should be tested and all the unfertile ones removed. If taken away at this stage they can be boiled and used for the chickens when they come out. For sanitary reasons they should be removed, as after a time they go rotten and give off a most unpleasant smell, and that may affect the health and vigour of the chickens.

As to the make and kind of incubator, there are many on the market, most of them said to be automatic in the regulation of temperature required.

Of these machines there are two kinds—those that cause a current of hot air to go into the egg chamber, and those that have hot water tanks that supply the heat to the brood chamber. Of these two principles, for summer work the former is decidedly the best, and probably for all the year round work as well. Of the latter kind there are those which automatically shut off the flame, and those that change the flame, but open a flue and let the extra heat escape. Of these, the former is decidedly the better, and can be used fairly successfully in hot weather, but neither of these kind of machines, nor in fact, any with the hot water tank, are reliable in downright hot weather. A little consideration will show that the water in the tank is always a good many degrees hotter than the air in the egg chamber, and if the weather is hot the water will get heated steadily, and give out its heat slowly to the chamber, and before the regulator in the chamber has begun to act the water in the tank may be 8 or 10 degrees above what it should be. This heat is steadily given out, and although the regulator may work all right and open the escape flue, yet the water will cool very slowly, if on a hot day perhaps not for hours, and meantime the temperature may have gone up in the egg chamber to 106deg. F., or even 110deg. F., and thus destroy the eggs.

With the machines that act with hot air only, there is no large body of reserve heat to run any such danger. If the lamp happened to go out in the air machine, it would cool much quicker, and perhaps chill the eggs before it was noticed, while with the tank machine it would take a very long time to cool, and no harm

probably be done before the accident was noticed, but the going out of the lamp is a very unlikely accident, and that is the only circumstance in which I can see that the tank machines have any pull over the hot air ones. A great number of second-hand machines are on the market, and the purchase of these is often a cause of trouble, for in many instances the machines are not in order, and frequently the capsule that works the lever and so regulates the heat is lost entirely. Unless a person is thoroughly up in the working of an incubator, it is a great risk to purchase a second-hand one.

One great cause of failure for eggs to hatch is that not sufficient moisture is supplied to the egg chamber, this is more especially the case as the season gets on and the weather becomes hot. I often have complaints that the chickens died in the shell, and were full grown ready for coming out. In most instances the cause is too dry an atmosphere in the egg chamber, some of the natural moisture is extracted from the eggs and the membrane just inside the shell gets hard and tough, so that the chickens cannot break through it.

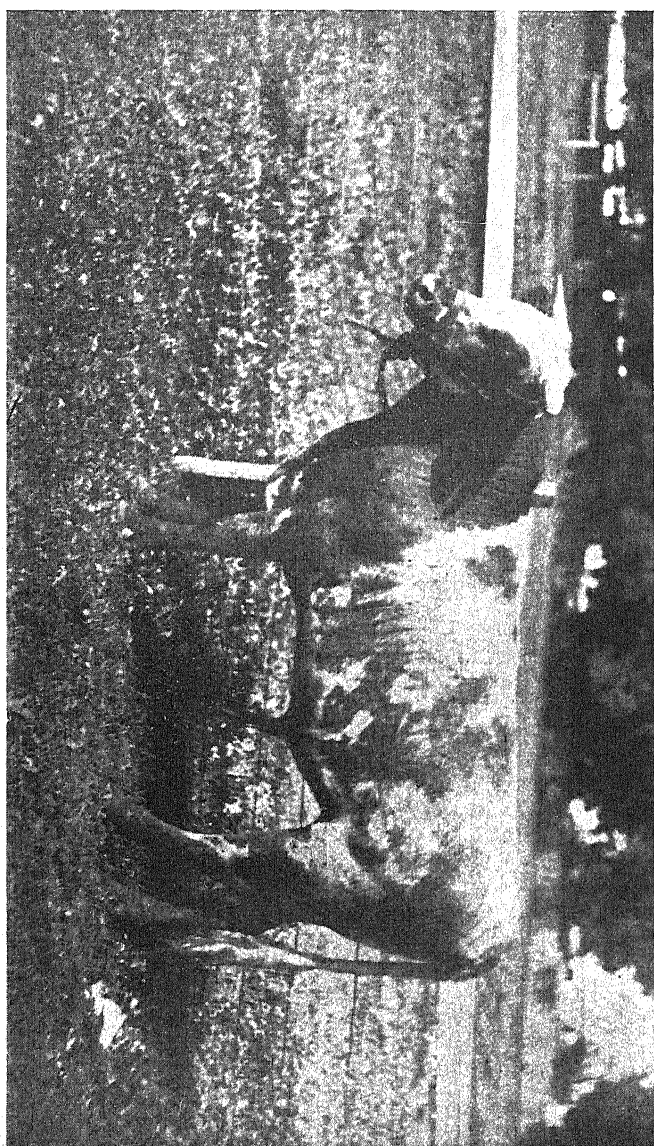
Duck eggs are especially liable to this, and it is a good plan to sprinkle duck eggs with tepid water each morning for some days before the date of hatching if the weather is hot and dry.

Care should be taken to see that the supply of water in the evaporation tank is always plentiful.

When the chickens hatch out, they should be taken out of the egg chamber and put into the drying box, and not be fed for at least 12 hours after that time. A little oatmeal and hard boiled egg is about the best thing that can be given them.

See that they are supplied with grit from the very start of life; in this colony where gravel and stones are scarce, to keep fowls healthy and in the best condition, grit is absolutely necessary—it is their teeth to masticate their food. The chickens may be removed to the foster mother after the first day, and they should then be plentifully supplied with green feed. A wire run should be made for them so that they will not get lost when they are very young or perished with cold, but after a couple of weeks they can be allowed free run, and they will always come back to the foster mother when cold or hungry. The great secret in bringing on chickens well, is to feed little and often, with plenty of green feed and grit. A little green bone or raw meat helps them wonderfully.

Be careful not to keep the foster mother too warm, it makes the chickens delicate and unhealthy. At first a temperature of 85deg. F. will be sufficient, and as they grow this can be gradually reduced to 70deg. F., and when the feathers grow well no artificial heat will be required at all.



SHORTHORN BULL.
"PAID OF ANOYE," (Recently Purchased by the Department of Agriculture from Mr. McKenzie Grant, Newmarket, N.H.)

ABORTION IN LIVE STOCK.

By H. H. EDWARDS.

Compared with the bovine race the pig is not susceptible to the influences which bring about abortion. Perhaps the chief reason for this lies in the fact that the nervous system is not so highly strung in the pachyderma. The sow is more often in trouble from *protracted labor* than she is from *abortion*. After all, however, it is a wonder that the modern, up-to-date sow comes out of her troubles as well as she does, for she is unique as an example of what changed conditions can do to alter the shape of animals and their mode of life. Contrast the Berkshire or the Yorkshire with the pig which gave them origin—the nightmare of a brute which our forefathers had the heart to feed and tend—(no one can say fatten), and one must marvel that the evolved animal is not only so prolific as it is, but that troubles, incidental to the generative process, are not more prevalent.

Comparatively rare as abortion is in the pig, it is often a source of great loss to the farmer. In the first place it is generally believed that a sow once having aborted her young is not safe for breeding purposes afterwards, for the reason that she will be apt to abort her next litter. By no means does this always happen, but the probability of such a thing makes the sow an undesirable one as a breeder.

Again, a cow may abort and yet yield sufficient milk to minimise, considerably, the attendant loss, but with the sow *all is loss*, and any milk she may secrete will be likely to bring about further trouble.

But, perhaps, worst of all, when a sow aborts it is usually an unexpected event so far as the owner is concerned, and left to herself the animal is more than likely to eat her slinked offspring. This is a calamity, for the sow will be untrustworthy as a mother as long as she lives.

THE CAUSES OF ABORTION IN THE PIG.

1. Feeding on ergotised grain or mouldy fodder.
2. Being carted, trucked or driven about in excessively hot weather.
3. Being the subject of an acute febrile disease.
4. Constipation.
5. Overdoses of strong purgatives.

The first cause is one that yields a great many cases. "Anything will do for the pigs" the farmer may say, and they are forthwith turned on to a damaged crop, or a few bags of musty fodder are dealt out to them until it is all used up. This is

economy, and the farmer is pleased with himself, but not so the pigs. They are constipated, rendered unthrifty for the time being, the young ones sad looking objects for a few days at least, and the sow in pig aborts.

In regard to the second cause. Every pig breeder knows with what care a highly bred sow "in pig" should be carried from place to place, especially over rough country roads. The ordinary dray with a pig net is the most common conveyance used for the purpose in Australia, and nothing could be conceived that would shake up the internals more of man or beast. In hot weather a four or five mile rough ride of this kind is all that is necessary, as a rule, in the case of a bulky, pregnant, pampered sow, to make her abort. It is never wise to move such a sow about by any mode of conveyance. The pregnant sow requires great care, far more care than she receives, as a rule, in this country. She should have a regular diet, liberty to move about and exercise herself, freedom to walk out of her snugly bedded sty into her own spacious pig yard or paddock.

The third cause was dilated on when writing the article on abortion in the cow. It only remains to be said that although the pig is not subject to so many febrile diseases as the ox tribe, those to which it is mainly subject prove disastrous to the sow in young.

The fourth cause is one which should never exist if ordinary attention were paid to the pregnant sow, for as soon as the attendant observes that a sow is becoming constipated, he should place a little opening medicine in her food. Pigs take medicine very well in this way, such as salts or even castor oil.

The fifth cause, strong doses of salts, particularly when given in combination with nux vomica, are decidedly dangerous. Sulphur too, a medicine commonly administered to pigs, should be sparingly given to a sow in young. Moreover, apart from the effect of the medicines, drenching the animal at this time should never be thought of, except under very pressing circumstances.

For a man to become a successful breeder of any kind of live stock attention and judgment are ever necessary, and there are few who realise that, in regard to the breeding of pigs, they are altogether indispensable.

(To be continued).

JERSEY HEIFER.

Typical Jersey Heifer, two years old, bred by Mr. Alick Murray, of South Australia, and owned by Mr. F. Meagher, of Dardenup. She has two strains of the "Progress III." blood in her. She made 9 lbs. of butter per week after her first calf.

JERSEY HEIFER.



THE NEWMARRACARRA ESTATE.

REPORT BY INSPECTOR FRY.

While the Minister of Lands was touring the Geraldton district last year, he paid a visit to Mr. Grant's station and homestead, at Newmarracarra. Although the visit took place in the month of November, which is not the most favourable time to see the station to advantage, he was so favourably impressed with all he saw—the land and its treatment, the homestead, the stock, and the whole surroundings, together with Mr. Grant's able management—that he promised Mr. Grant that an officer should visit and report in detail at a time when the country would be seen under more favourable conditions. The accompanying interesting report by Inspector Fry is the result. The Minister considers the station an ideal one, and a fulfilment of "The Squatter's Dream." The report is as follows:—

"No part of Western Australia can boast of so many beautiful estates as the sheep stations that lie in the neighbourhood of Geraldton and Northampton, such as the Bowes, Mount Erin, Oakabella, White Peak, Narra, Tarra, Sand Springs, Tibbadden, Minenooka, Newmarracarra and Glengarry, and undoubtedly the last two, known as the Newmarracarra Estate, are the finest and most valuable stations in the South-Western district, if not of Western Australia.

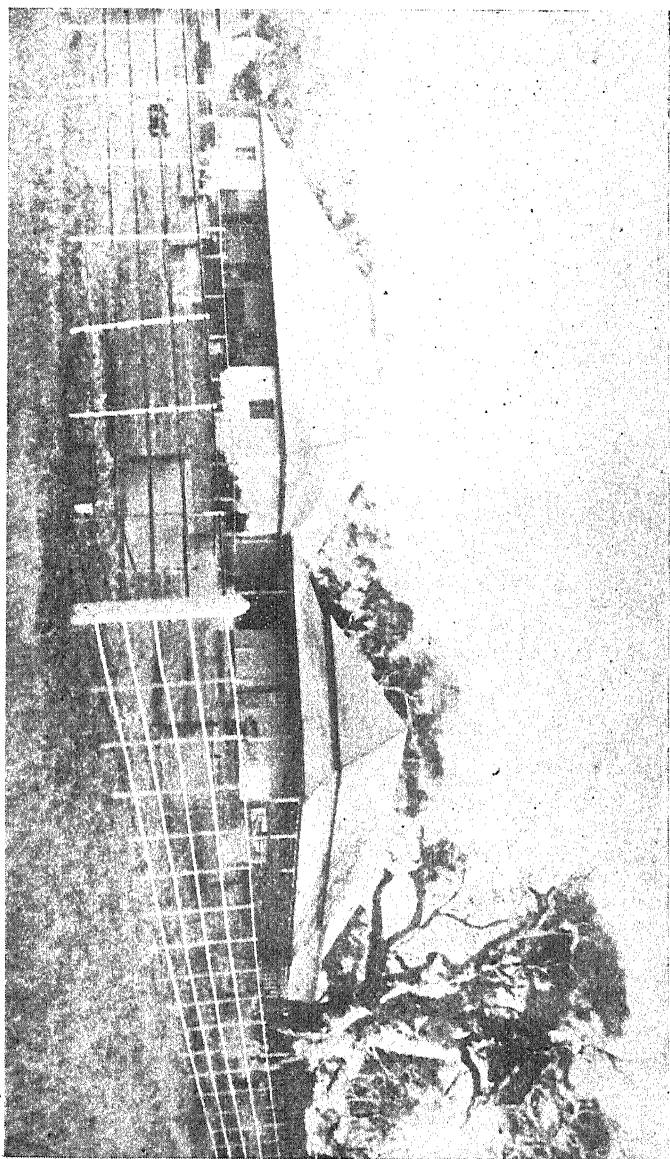
"This estate lies east of, and about 18 miles from Geraldton, to which town there is an excellent road, metalled most of the way. The line from Mullewa Junction to Cue runs through the centre of the property. There is no railway station at this spot, but the train always stops at No. 1 tank for water. This tank is situated about two miles and a half from Newmarracarra homestead. The estate has an area of 100,000 acres, 60,000 of which are freehold, the balance being leasehold. The country is generally of an undulating nature, containing many high and picturesque hills and beautiful rich flats, timbered with jams, York gums, sandalwood and wattles. Just now the whole presents a magnificent appearance, waving like a cornfield with long grass, and in favoured spots brilliant with myriads of wildflowers. It is estimated that there are 40,000 acres of first-class, 40,000 second-class and 20,000 acres of third-class land on the estate, which is highly improved. It is sub-divided into 53 paddocks, ranging from 200 acres to 1,500 acres in extent. There are also 24 small fields. All the subdivisions are substantially fenced with seven wires and jam posts. The fence lines are all cleared for half a chain on both sides, and there are upwards of 400 miles of fencing on the estate, not including that on various cultivation fields and small enclosures used for stud stock. The property is splendidly and naturally watered

by 12 springs, and the Greenough River, in addition to which there are four wells with windmills, 12 stand-by wells, three excavated tanks, and 14 dams on the watercourses. The timber on 10,000 acres has been mullinized, 12,000 acres have been ring-barked, 4,000 acres are fit for the plough, and there are 700 acres at present under crop at Moonyoonooka farm, which forms part of the station. The homestead at Newmarracarra overlooks an immense scope of country, which might be described in the words of the poet as a 'Pomp of hill and dale.' Standing on the verandah and looking south, the view reminds one of the lovely scenery of North Wales. The house and outbuildings are in keeping with the general surroundings, and are estimated to have cost £5,000. There is a second homestead on the station, situated at Glengarry. The house is not of so commanding and substantial a character as the one at Newmarracarra, but the outbuildings are superb. A square court-yard is enclosed by stone buildings of one and two storeys, containing stables, with loose boxes, barns, various sheds for buggies and carts, quarters for shearers, woolshed, shearing-shed, wool-press room and offices. All the buildings are most compact and handy for station work. The enclosure is used as a horse yard, and in the centre there is a well, with water troughs, etc.

"A very large portion of the 60,000 acres of freehold land was formerly badly infested with poison. Something like 30,000 acres have been effectually cleared of all noxious plants. From 15 to 20 men have been employed periodically in the eradication of these, and upwards of £7,500 have been expended in this work. Altogether, close on £55,000 have been spent on improvements, and the work of further enhancing the property is still proceeding. The estate is being splendidly managed by Mr. W. McKenzie Grant, more familiarly known as 'Wattie' among his friends and neighbours, with all of whom he is most popular. Mr. Grant is an ideal Australian. Tall, active, a great athlete, a fearless rider and driver, and characterised withal by a most gentle and courteous manner, he possesses the knack of making all animals docile and tractable. All the stock about the station are wonderfully tame. Horses, cows, sheep, and even the pigs obey his word of command.

STOCK.

"At the present time the run carries 24,000 sheep, 132 head of cattle, and 150 horses. It is capable of carrying any year 30,000 sheep, but, having been favoured this year with copious rains (over 24in. up to date), it would easily carry 40,000 sheep. In addition to the above stock, there are on the place two Brahmin cows, one donkey, and about sixty cats, the last being, as explained by Mr. 'Wattie,' the nucleus of an army to confront the rabbits when they invade Newmarracarra.



NEWMARACARRA ESTATE.
The Newmaracarra Homestead.

SHEEP.

"The sheep are being steadily worked up to a high standard, rams being used from the Murray, Crozier, and Canowie flocks. The stud stock was started some 10 years ago by the late Mr. McKenzie Grant, with ewes purchased from Mr. E. W. Pitts, of The Levels, South Australia; high-class rams from J. T. Edgar, of Kadnook; and from Messrs. Murray. In 1898, 100 specially selected ewes were imported from Mr. J. Murray, of Rhine Park. Early in 1899 two high-class rams were imported from South Australia, one bred by Mr. A. J. Murray, of Mount Crawford, the price being 100 guineas, and the other bred by Mr. W. D. Crozier, of Rockbrook, Kapunda, and purchased for 50 guineas. Both rams are evenly and densely fleeced, and should leave their mark behind them. The stud flock last year shorn an average of 9½lb. of beautifully clean wool, the majority of the ewes being full-mouthed, and each having reared a lamb, the remainder being two-tooths.

CATTLE.

"The shorthorn herd was started in 1898 with 20 high-class cows, imported from South Australia, bred by Mr. T. R. Bowman, of Campbell Park. The bull is a fine docile beast ('Pride of the Lake') and being of the same blood as the cows the correct breeding lines are being followed. The young stock appear promising, particularly the young bull ('Newmarracarra Pride'). Mr. W. Grant hopes to be able to paralyse some of the old breeders in these northern districts by exhibiting some beauties at the Geraldton Show next month.

HORSES.

"A few of the old well-known Newmarracarra mares are still left, they being descendants of Banker (Melbourne Cup winner), Sir Hugh Korassen, and Agriculturist, all imported from England. The sires used at present are Richburg (Richmond—Serenity), and Field Artillery (Light Artillery—Sunnydale). A daughter of Richburg, viz., Special Reserve, a beautiful dark chestnut (a winner of numerous gents' and ladies' hack and hunting contests at Dongarra, Greenough, and Geraldton, carrying in each instance 14st.), appears to have a special liking for jumping. I had the pleasure of witnessing her taking a leap at word of command, and riderless. She cleared 6 ft. with remarkable ease. She has done the same jump with a rider on her back without saddle or bridle. It is to be hoped that Mr. Grant will bring his mare down to the next Guildford Show, and give an exhibition of her jumping capabilities and the excellent training she has received. Bloodshed a son of Blink Bonny, a Caulfield Cup winner, and Wellshot (Off Color—Ethel) were both used for a season. Their stock is very promising, as also is the son of Gouda (Neckersgat—Etta), from Rumour and Richburg. He should be heard of on the turf, being a remarkable even colt.

The Clydesdale stallion, True Blue, now at stud, is a very good-constituted horse, set on short legs, and showing great strength and good hair. The draught stock appears serviceable throughout. Little need be said about it, as the B. station brand is always eagerly sought after by the goldfields carriers. They have just imported the high-class horse O'Brien (Monarch—Whitefoot), bred in the Bathurst district, N.S.W. He was a first prize taker at the Bathurst show some years ago. He is a massive horse, showing an immense amount of quality. His progeny should make excellent horses for export.

Pigs.

"Pigs of the Berkshire strain, 130 in number, are in strong evidence at Newmarracarra, a small stud herd being kept, which comprises a few high-class pigs bred by James Morrison, Esq., of Waterhall, Guildford. The boar was obtained from the Hon. J. H. Angus, of Collingrove, South Australia. This is a fine lengthy pig, showing the true characteristics of the Berkshire breed.

Dogs.

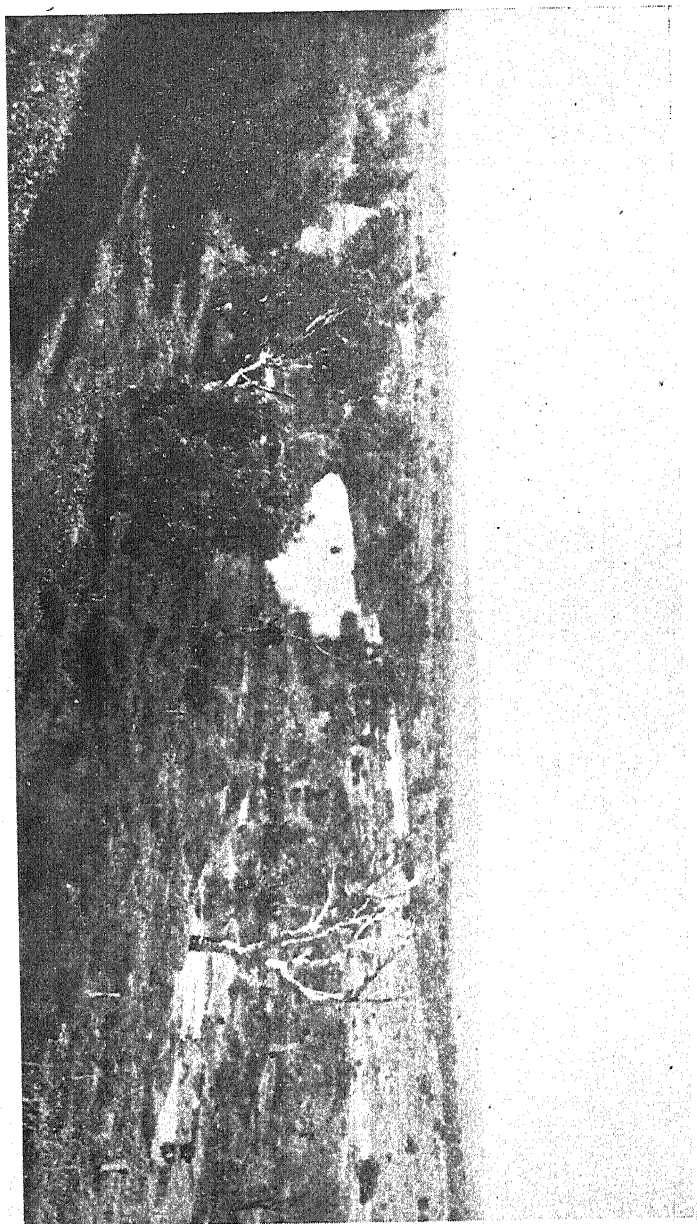
"Mr. Grant is a great dog fancier, and has some very good-class working collies, sons of C. S. Kemp's Rod, a noted South Australian prize-winner. Kangaroos having become a great pest in this district, some 12 months ago Mr. Grant imported a high-class deerhound, a daughter of the champion, Flora McDonald, bred by M. C. Davies, of Sydney. She was mated with Ben, a descendant of the famous English dog Rossie Bran. The progeny are doing well, and promise to develop into powerful and speedy dogs.

FOWLS.

"All the common breeds have been sold, and the following only are now kept on the estate:—Silver-laced Wyandotte, Indian game, silver-spangled Hamburg."

THEY NEVER DRINK.

An exchange says:—There are hundreds of horses and thousands of cattle in the Hawaiian Islands which never take a drink of water throughout the whole course of their lives. On all the islands the upper altitudes of the mountains are given up to cattle ranges. The cattle run wild from the time they are born until they are sent to the slaughter-house. Except possibly two or three months in the rainy season, there are no streams or pools of water in any part where the cattle range, but everywhere there grows a recumbent, jointed grass known by the name of maninia. This is both food and drink. Horses and cattle grazing on it neither require water, nor drink it when offered.



NEWMARRACARRA ESTATE.
View from the Glenigary Homestead.

The above notice was submitted to Dr. A. Morrison, the Government Botanist, who reports as follows:—This “Maninia” appears to be the same as that spelt “Manienie,” and if so, is already well-known in this colony. “Manienie” is the native name of the Hawaiian Islanders for what is called Buffalo Grass (*Stenotaphrum Americanum*). It is indigenous in all the islands of the Hawaiian group, as in the tropics of the various continents, and forms broad patches on the open slopes up to 2,000ft. above sea level. The name “Manienie” means creeping grass, and is applied also to another grass that is not a native of Hawaii, but was introduced in the year 1835. This is *Cynodon Dactylon*, the Indian “Doob” grass or the “Couch” of these colonies, also well-known here. It has spread over all the Hawaiian Islands, crowding out every other plant in favorable situations, and is considered the most valuable pasture grass of the lower levels, but not thriving over 800ft. above the sea. It is also useful for binding loose sand near the coasts. It should be remembered that the climate and vegetation on the Pacific Islands are very different from those of this colony, and the needs of cattle as regards their thirst will differ accordingly.

INDIAN FIBRE PLANTS.

Attention is again being given in India to the cultivation of plants likely to supply good fibre, and there has again been an increased demand for plants of rhea. According to the report of the Royal Botanic Garden, Calcutta, a machine for extracting rhea fibre, which is said to fulfil all requirements, and which certainly meets the needs of rhea-growers better than any of the machines hitherto offered, has at last been put upon the market, and its appearance seems likely to give a fresh impetus to rhea cultivation. The number of people who now possess smaller or larger stocks of the plant is considerable, and the cultivation of rhea on an extensive scale ought, if trade prospects prove sufficiently inviting, to be easily undertaken in suitable localities. Great interest is also being shown in the fibres from “Mauritius hemp,” from “bow-string hemp,” and particularly from some of the species of *Agave* under cultivation in India. It is noteworthy that the interest of cultivators is by no means confined to the particular *Agave* known as “Sisal hemp,” the introduction of which, on a large scale, was recorded in 1892 and 1893, but extends to the plant known familiarly as the “American Aloe”—not a happy designation, seeing that the plant is not an aloe, but an agave, and that, moreover, it is not *Agave Americana*. Every aid is being given to those interested in this matter, though, as with rhea, the great difficulty is not the absence of a supply of plants, but the need of a machine capable of separating their fibre cheaply and satisfactorily.

PLANT FUMIGATION.

THE fumigation of trees by means of hydrocyanic acid gas is fast becoming more popular.

The success of the operation and its safety to the operators depend on the method this fumigation is carried out. As very little is known about these methods (by fruit growers) a few directions will prove useful, pending more detailed information regarding the process of fumigation, the making and handling of the gas-tight tents which will shortly be published with suitable illustrations.

WHAT AND WHEN TO FUMIGATE.

Fumigation by means of hydrocyanic or prussic acid gas is successfully used in the treatment of insect pests, it has little effect on blights of fungoid origin; insects which can be more readily attacked are scales, red spider and mites, aphides. Trees and plants can be fumigated at any season of the year. In the winter time deciduous trees can, without injury, be fumigated at any time of the day, they can also when dormant stand heavier doses of gas as well as a longer period under the tent. Citrus trees require more careful treatment, and should only be fumigated on dull mornings or afternoons or in the evening by moonlight.

In the summer, when the trees are of active growth, they should only be fumigated late in the afternoon or at night.

CAUTION TO OPERATORS.

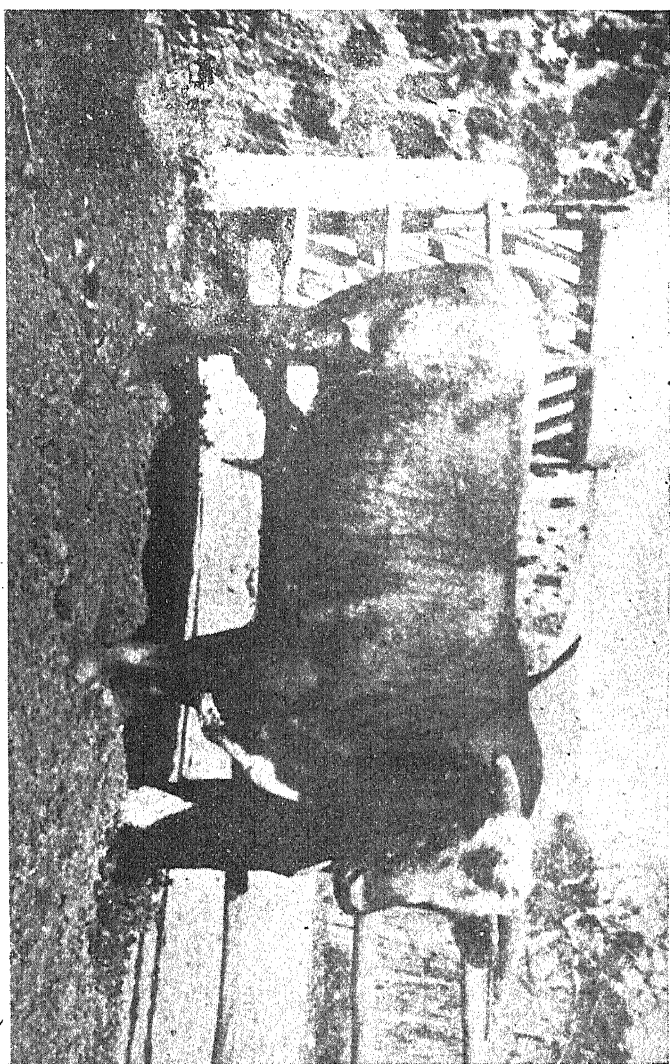
Those using the process of fumigation for the treatment of scaly trees should bear in mind that they are handling probably the most insidious and deadly of poisons.

The gas inhaled in close chamber produces sudden death; when largely diluted with air it is harmless. Hundreds of thousands of trees are now-a-days fumigated every year, and accidents are rare. With proper precautions there is no danger whatever.

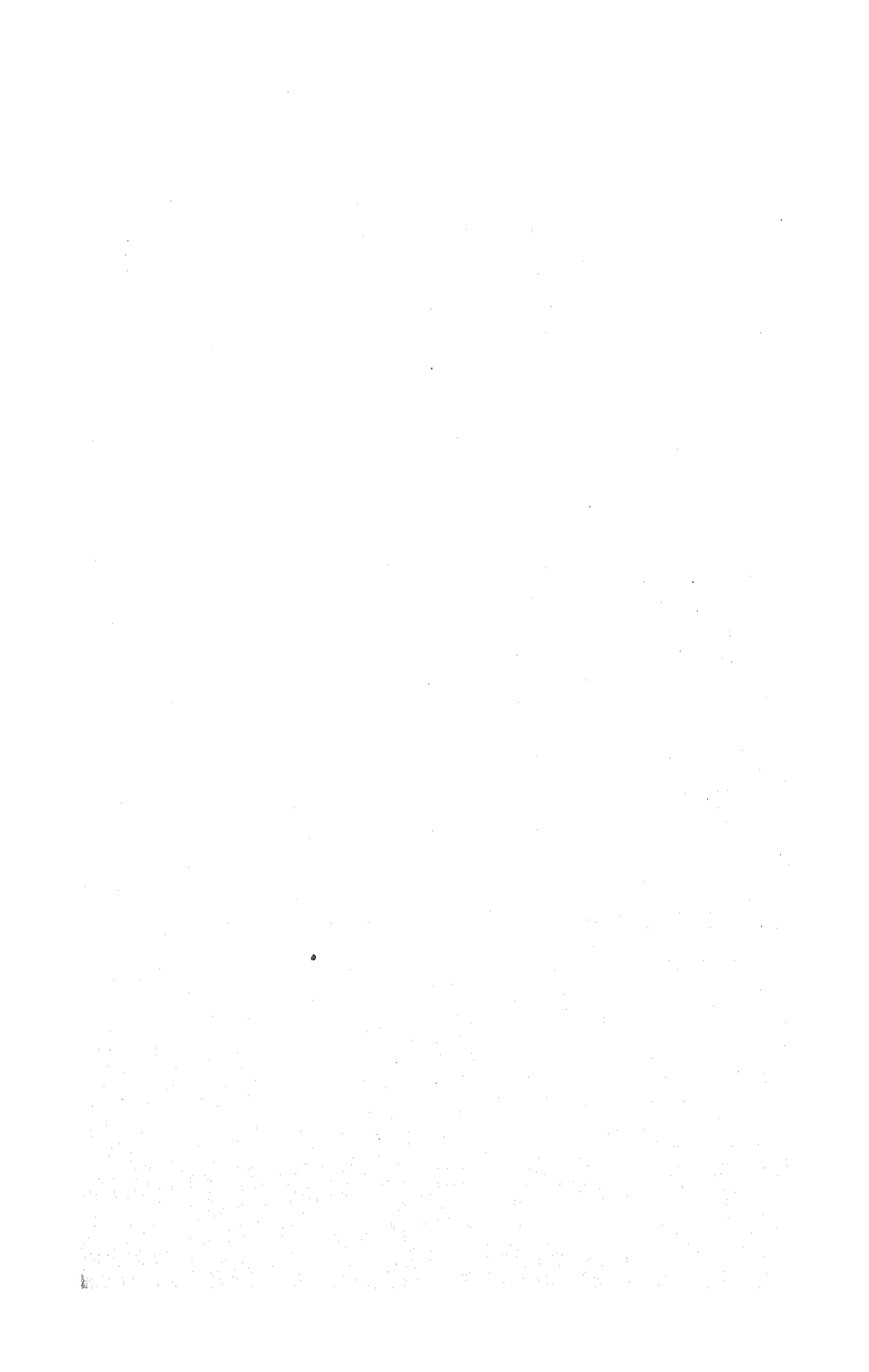
Unless handling small tents covering trees 5ft. or 6ft. high, not less than two men should operate.

Not only is the hydrocyanic acid gas highly poisonous, but the ingredients or chemicals used in its production are also dangerous poisons. These ingredients are: 1° potassium-cyanide, of which a piece of the size of a grain of wheat would prove fatal to an adult or an animal; 2° sulphuric acid or oil of vitriol which is eminently corrosive, and every precaution should be taken to guard against its spurting on the face, hands or clothes.

When operating hold your breath when dropping the cyanide into the acid, and also when removing the tent and uncovering the tree. See that the tents are always gas tight. Should the



NEWMARRACARRA ESTATE.
Shorthorn Bull, "PAIDE OF THE LAKE."



acid accidentally spurt on your hands or face, wash at once in water.

Do not handle a clean tree after having examined a diseased one, without previously washing your hands, as the eggs and larvæ of some of the scales are so small that they are easily carried from one tree to another by the growers themselves or their men. I have often seen people crush scale insects on branches of trees, between their fingers, and then go to the adjoining tree and carelessly handle it and examine it for scales. Trees infested with the San Jose and the more dangerous sorts of scales, should not be handled unless it is found necessary to do so.

FUMIGATING OUTFIT.

Consists of gas-tight tents made of light, strong canvas, cut and sewn together in a bell shape, and painted with raw linseed oil. A little turpentine added to the oil will cause it to dry quicker. When painting spread the tent well by hanging it to the rafters of a shed or the branches of a tree, and leave it to dry thus spread out lest the tissue of the canvas should heat and rot. Calico is rather a light material for the manufacture of tents, it wears badly and requires constant patching up. It is advisable to have rings at the sides and top of the tent to ease it over trees by means of a light pole, with a fork at the end. A light gas piping hoop rung through rings at the base of the bell shaped tent, is found convenient for covering and uncovering trees, and for keeping the tent stretched out. At the base of the tent and below the ring a gas-tight flange or canvas collar about a foot wide is provided and rests on the ground. After the tent has been charged, this canvas collar is slightly banked up all round with earth to prevent the gas escaping.

Trees too large to be covered with a tent may be fumigated under a large gas tight canvas sheet thrown over them.

Also provide yourself with :

- 1°. A common earthenware basin, 6 to 9 inches wide, according to size of tent or tree.
- 2°. Scales for weighing the cyanide of potassium.
- 3°. A graduated glass for measuring the fluid ounces of sulphuric acid and of water.
- 4°. If a gas piping ring is not provided to keep the tent spread out at the base, have an 18ft. light pole with rope and pulley to hoist the larger tents over the tree.
- 5°. Sufficient number of 1 oz. packets of cyanide of potassium, 98 per cent. purity, which must be kept in an air-tight jar.
- 6°. Sulphuric acid in a bottle with a glass stopper.
- 7°. Water.

DOSES AND TIME.

Cyanide of potassium, 98 per cent. purity, 1 oz. per 100 cub. ft.
Sulphuric acid of commerce, $1\frac{1}{2}$ fluid oz. per 100 cub. ft.
Water, $2\frac{1}{2}$ fluid oz. per 100 cub. ft.

NOTE.—If fumigating in the winter for the more resistant scales, and particularly San Jose scale, the doses might be increased to: Cyanide of potassium, $1\frac{1}{4}$ oz.; sulphuric acid, 2 fluid oz.; and water, 3 fluid oz. per 100 cub. ft.

The tree having been covered, one operator lifts the bottom of the tent: the other after having poured in the earthenware bowl the quantity of water and acid (N.B.—Pour the acid slowly into the water to prevent spurting), crawls underneath and places that bowl under the tent, close to the trunk of the tree, but not touching it. Then at arm's length he breaks the paper cover of the cyanide of potassium and drops the number of packets required into the bowl holding his breath meanwhile and crawling back, the tent is then let down, earth heaped up on the circular canvas collar, and the tent allowed to remain on the tree 45 to 60 minutes.

N.B.—The mere fact of covering a tree in full growth by means of an air-tight tent, while the sun is up and the plant breathing, for an hour or two, is enough to choke it and cause it to drop its foliage, therefore be careful to only fumigate if in the growing months, in the cool of the evening or early in the morning. If the tree is dripping wet or is covered with beads of dew injury to the foliage might result.

When the time is over, the operator and his assistant uncover the tree by lifting the tent up, holding their breath while so doing, when another tree can be covered and treated without pausing.

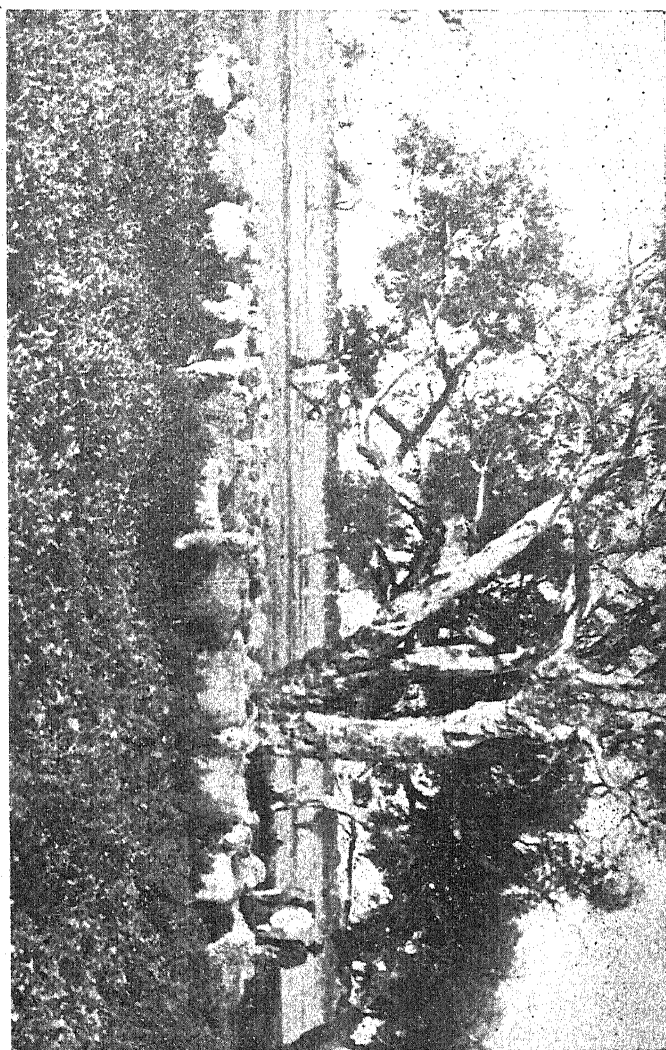
Should a battery of half a dozen tents be in use, a considerable number of trees can be fumigated at once and without waste of time.

Bury the residue left in the bowl after fumigation.

THE BEE MOTH AND ITS RAVAGES.

ONE OF THE MOST FORMIDABLE PESTS OF THE APIARY.

Percy H. Selwyn in *Montreal Herald and Star*:—"The bee moth (*Galleria mellonella*) has been recognised from time immemorial as one of the most formidable enemies of the honey bee, and doubtless before the introduction of the movable frame hive these pests of the apiary must have been a continual menace to profitable bee-keeping. Even at the present time the voracious larvæ of this moth are the cause, either directly or indirectly, of the total destruction of many hundreds, if not thousands, of colonies annually. That this should now be so is due almost entirely to lack of knowledge in bee-keeping, or else in carelessness and neglect. For those who cannot or will not adopt modern hives, and still keep their bees in box hives, loss from this cause is to be expected, and it is, to a certain extent, excusable, as only a skilled bee-keeper can form any correct idea of the actual conditions existing in such hives, and even he will often be at fault.



NEWMARRACARRA ESTATE.
[Stud Ewes and Lambs.]

Advanced bee-keepers no longer regard the bee moth as a dangerous enemy to their calling, and in large, skilfully managed apiaries it is probable that the annual loss due to this cause is now practically nil. The loss sustained is, therefore, either confined to the novice, the careless, or the box-hive bee-keeper, and it is to these three classes of my fellow workers that this article is particularly addressed.

That the bees so often fail in their attempts to dislodge these unwelcome visitors is probably due to the fact that the grub is not satisfied with the comparatively slight protection which the porous capping of the cells affords, but in addition to this it surrounds itself with a tough silken web or gallery in which it can move with great rapidity either backward or forward without being able to turn around. This web appears to be quite impervious to the bees, and it seems doubtful if they can even penetrate it with their stings, and so far as I am aware, there is no evidence that they ever destroy their natural enemy in that way.

The true bee moth is much more rapid in its movements than the other moths which frequent the apiary. Like them, however, it does not fly or change its resting place, unless disturbed, until about dusk, when it may be seen either hovering about the hives or running with incredible swiftness up and down the outside, and now and then making a bold dash for the entrance, often passing the bees on guard without them appearing to notice it. I make a practice, and would advise other bee-keepers to do the same, of always promptly killing every bee moth that I can lay hands on. When the hives are painted and in sound condition, it is an easy matter to detect any moths which may be resting on the under side of any projecting parts of the hive or cover. A glance at each hive is sufficient, and if done regularly, early in the morning and just before dusk each evening, many hundreds will be destroyed in the course of the season.

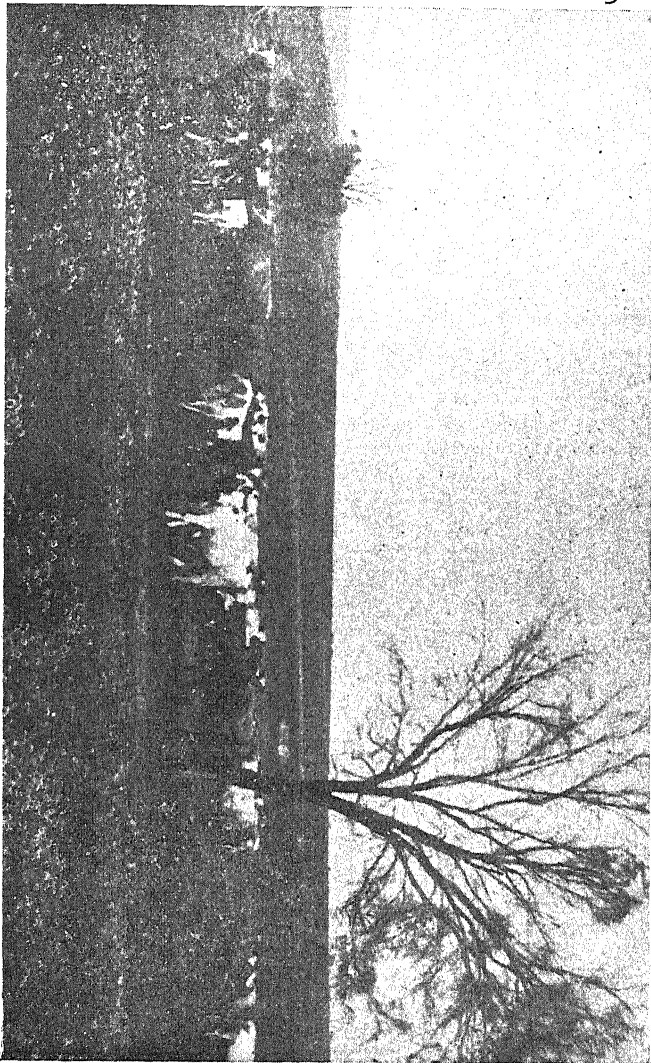
Undoubtedly the primary and most fruitful cause of loss from the bee moth, or, as commonly called, "miller" larvæ, is allowing hives to remain queenless for a considerable period. A brief description of what takes place in a hive during its gradual decline from the zenith of power and prosperity to its ultimate and complete destruction may be both interesting and instructive. A prosperous hive, taken, say at midsummer, should contain a queen, 40,000 to 60,000 workers, several hundred drones, and eight or more combs containing honey, pollen and brood in all stages. Now, let us suppose that the queen dies, or in some way is killed, what is the result? The bees, knowing in a wonderfully short space of time, that she is dead, at once set to work to repair their loss. This they are able to do, because, under normal conditions, there will be plenty of young larvæ or eggs from which a new queen can be raised. Queen cells will at once be started, or, perhaps more correctly speaking, worker cells already containing eggs or young larvæ will be enlarged and shaped into queen cells to the

number of a dozen or more, and the work of the hive will go merrily on. In from twelve to fifteen days, sometimes less, these young queens will begin to hatch, the time depending upon whether they began their royal existence as larvæ or eggs.

There is always the likelihood, in fact, probability, that this influx of young queens will cause swarming; but for the purpose of this description, we will see what takes place when no swarm issues. If two or more queens hatch simultaneously there is a battle royal, and the "survival of the fittest," then all the other queen cells are torn open and the helpless inmates pulled out and destroyed. In a few days the chosen, or rather conquering queen, being a virgin, leaves the hive to meet the drone. On her safe return from these journeys, which take place between 12 and 4 o'clock on fine, bright days only, depends the fate of the whole colony. The reason for this is obvious, when it is known that under ordinary conditions, and without the bee-keeper's aid in supplying the deficiency, the bees can no longer obtain another queen, there being by this time nothing but brood, the youngest of which is within a few days of hatching, left in the hive. The daily death rate in any populous colony is very heavy during the working season, consequently the sixteen or more days without a laying queen have marked the first stage in the colony's decline. When, in addition to this, the virgin queen, now their only hope, leaves the hive to return no more, as, from various accidental causes is so often the case, the work of decimation goes rapidly on.

From this time onward the closing scenes follow rapidly. The few remaining bees, being now destitute of food, either die or unite with other colonies, often the one that has robbed them, and the bee moths and their loathsome progeny soon complete the work of destruction. It may seem almost incredible, but it is nevertheless true, that when the end comes all that is left of this once prosperous and populous colony consists of the hive and frames, the latter absolutely devoid of combs, but held together with a filthy mass of webs, excrement and cocoons. It is by no means uncommon to find the wood of both frames and hive actually gnawed and grooved by the strong jaws of the adult larvæ when seeking for a suitable place to spin their cocoons.

Let us now see the actual harm done and loss sustained by the only too frequent occurrence: First—a whole army of well-developed, and consequently prolific, moths are spread broadcast through the apiary. Second—eight or more combs are completely destroyed and their usefulness lost, as well as the actual value of the wax. Third—the honey removed is just as likely as not to be in the neighbor's apiary, particularly if he should happen to be a good practical and careful bee-keeper. The moral of all this, keep your colony strong, and, above all, learn to know when a colony is queen-less or has a drone-laying queen, and apply the remedy in time either by providing it with a frame containing eggs or young larvæ, or, better still, a perfect queen."—*Weekly Chronicle*.



NEWMARRACARRA ESTATE.
Group of Cattle.

BEE-KEEPING.

By A. CRAWFORD.

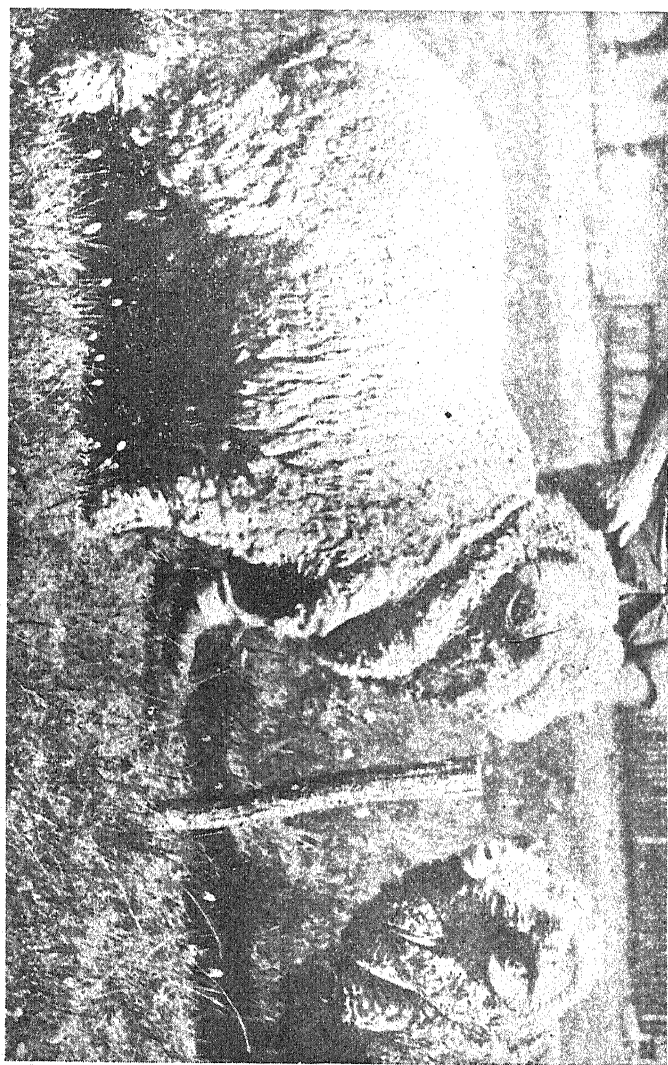
In last month's JOURNAL the question of who should keep bees was discussed, and since writing it I have been asked where should bees be kept. I made it pretty plain that bees might be kept almost anywhere, in town or in country. The best place to keep bees if you wish to get large returns is in the timber country, amongst the red-gum especially. The honey from it is plentiful and of first-class quality. The jarrah forests yield large returns, but the honey is rather thin and acrid in taste. York gum, salmon gum and morrell all yield good-coloured, good-flavoured honies. If it is only desired to keep one or two hives, or just sufficient to supply the home, they may be kept almost anywhere. Many persons keep bees in the centre of large towns, and find that they produce largely. It is quite probable that their honey would not stand a chemical analysis, being largely made up of sugar and other saccharine matter, but sufficient honey is generally obtained to give it at least the flavor, and make it palatable. I have seen four hives kept in a street off the Strand in London and average over 40 pounds of honey each. So, if even in a cold climate like that such a return can be obtained, anyone in any of our cities here should be able to do much better. A back yard, a house-top or a room can be used to keep them. If the hive is kept in a room the window must be so fixed that the bees can have free access to the hive at all times. A small wooden passage or metal one can be made from the entrance of hive to the window, which should be just opened sufficiently to allow the bees to come in, the rest of the open part of the window may be blocked up with a thin piece of wood; by this means no bees will be able to get into the room unless when the hive is opened. These can easily be got rid of by opening the window at top and bottom.

For those keeping bees like this the most convenient way of getting the honey is to have it in sections, that is, in little square boxes that, when full, hold just about one pound. By getting the honey in these, there will be no trouble in extracting the honey—one or more sections can be removed when desired. A box-framed hive with two section crates will be required, and a queen excluder on top of the hive, underneath the section crate, to keep the queen from going up above and laying in the sections. When one crate of sections is well started by the bees, take it off and put the empty one on the hive and the one they are working in on top. When the top one is full or almost so, take all the full sections out, replace them with empty ones that have got a little comb foundation in them, so that the bees will start making their comb in the right direction. Then, if the bees have made a fair start in the under one, remove it and put the empty one underneath, and keep on working like this all through the season. A small triangular

piece of comb foundation an inch deep will be quite sufficient for a starter ; it can be obtained from any of the dealers in bee requisites. Having obtained a hive and bees, the next thing to do is to become familiar with the inhabitants of the hive. Of these we find that there are three varieties, the queen or mother bee (only one in the hive), the drones or males, some hundreds or thousands, and the workers, which are undeveloped females, of which there ought to be from forty to sixty thousand. The drones are only to be found in the spring or summer, according to the quantity of honey that is to be found. As soon as the honey supply falls off the drones are destroyed, as they are non-workers, and would only consume the stores.

The queen bee is easily distinguished from the others by her long tapering body, short wings and much greater size than the workers. A good queen will lay from 3,000 to 4,000 eggs per day in the busy season, and as the season advances towards winter, some queens will cease laying altogether for a time, others will lay a few eggs daily. If a hive is carefully examined, two kinds of comb will be found, one having cells much larger than the other ; these larger cells are the ones in which the drones are hatched, and the smaller ones, of which there are by far the greatest number, are the cells in which the workers are reared. The queen cell is quite different to the others, and stands out by itself, being something like a small acorn.

In the early spring the eggs are laid only in the worker cells, but as the season advances, the queen lays in the drone cells so as to have drones in the hive when swarming time arrives. When the queen lays her eggs, she affixes it to the bottom of the cell, where it can be seen, a small white speck. In three days the eggs hatch, and the grub or larva lies in the bottom of the cell, where it is fed by the worker bees. The larva or grub now grows very rapidly, and in six or seven days fills up the bottom of the cell. The top of the cell is now covered over, and the grubs or larva left to go into the chrysalis stage, and after about 11 days it emerges a perfect bee, ready to start work. When it first comes out it is fluffy looking, and has a fine down upon its back, and is easily distinguished from the other bees that have the down rubbed off them in the hurry and bustle of everyday work. The young bee does not go out for a day or two, but helps in the domestic work, and gets a general insight into the internal working of the hive, and then it takes its place as an ordinary worker. In the busy season a worker bee's life is only about six weeks, it actually works itself to death, night and day it keeps on without rest. From this, it can be seen that it is of the utmost importance to have a good laying queen, so as to keep up the strength of the hive, all the worker bees of which have to be renewed every six weeks. The drones grow much larger than the workers, about the same size as the queen, but instead of having a long tapering body, it is blunt. The drones have no sting. The queen has a sting, but is



NEWMARRACARRA ESTATE.
Merino Rams, "NEWMARRACARRA" and "GLEGARRY."

not able to use it when picked up. The drones live much longer than the workers ; in fact, would live the whole season through if allowed, but they are disposed of immediately the honey supply falls off.

The queen bee is hatched in a cell quite different from the others, sometimes it is at the bottom of the comb, sometimes in the centre or sides ; it takes three days for the egg to hatch, and the larva or grub is fed for five days on a different food to that on which the other grubs are fed, the cell is then sealed, and in seven or eight days the perfect queen comes out.

Thus we find that from the laying of the eggs a queen hatches in about 15 or 16 days, a worker in 20 or 21 days, and a drone in 24 or 25 days.

From three to five days after a young queen is hatched, she flies from the hive to meet the drone, which takes place in the air. She then returns to the hive fertilised, and in a few days begins to lay eggs, remaining in the hive the rest of her life, except at swarming time, when she leaves the old home and never returns to it, going away with the swarm and starting a new one. The average life of a queen bee is about four years. The working bee, in addition to gathering honey, gathers pollen, makes the comb and wax, feeds the grubs, seals them up, guards the hive, and does all the house work, such as cleaning up, removing rubbish, dead bees, etc., from the hive, and is generally useful.

THE BOT FLY.

The Stock Branch Veterinary Surgeon (Mr. J. D. Stewart) has submitted to the Minister for Mines and Agriculture a report on the bot-fly, which has become acclimatised in New South Wales, and concerning which inquiries are often made. He states that the fly is specially prevalent in the southern parts of the colony. It deposits its eggs on the breast, shoulders and forearms of horses when turned out to graze. The eggs, which are of conical shape and a yellowish-white colour, hatch out larvæ after about four or five days, which cause irritation, and in licking the irritated parts the horse receives the larvæ into his stomach. To prevent this, the affected parts should be smeared with preparations of tar and grease. Oil of creosote and linseed oil (one of the former to ten of the latter) make a very effective dressing. Many of the sheep dips diluted with water when used as a wash destroys the eggs and larvæ on the skin. Care should be taken in summer not to apply the smears in too concentrated a form, or they may blister. The presence of a number of larvæ in the stomach may be a cause of indigestion leading to colic or a fatal termination. When once they become attached to the lining membrane of the stomach, it is a very difficult matter to remove them by the administering of medicine. But, fortunately, on attaining maturity, after about 10 months' sojourn in the stomach, they become detached voluntarily, and are expelled with the fæces.

SHORTHORN BULL MEASUREMENTS.

Those who go in for breeding Shorthorn cattle may find the following information taken from the *Farmer and Stock Breeder* interesting, and be able to compare their own stock with some of the best in the old country.

It is a very good calf that measures 2ft. 5in. in girth at birth, an occasional one going up to 2ft. 7in. The general run is from 2ft. 3in. to 2ft. 5in. Their rate of growing is rather more than an inch per week for two months, and just about 1in. until they attain 5ft. It is difficult to maintain the 1in. per week after the 5ft. girth has been obtained, but it is a point in the show-yard calf to attain 4ft. 10in. to 5ft. at six months old, and 6ft. at 12 months, the majority at that age are under 6ft. The following are the measurements of several well-known bulls:—

Name of Bull.	Age		Girth.
	yrs.	mnts.	ft. in.
Duke of Howljhon	aged		9 6
Cleveland Lad	"		8 6
Alto	3	6	8 5
Master Harbinger	2	7	8 0
Hallrigg Swell	1	10	7 3
Duke of Barrington	1	9	7 0
Bagston Count 43	1	9	6 11
Ingram Pet	1	6	7 2
Earl of Torwood 16	1	5½	7 4
Pretender	1	5½	6 11
Ingram Style... ..	1	5	6 5
Czarowitz	1	4½	6 9½
Persimmon	1	1	6 6
Major General	1	0	6 6
Mango	0	11	5 10
Specey Robin	0	10	5 7
Gallant Knight	0	10	5 8
Royal Jeweller	0	9	5 3

SOILING VERSUS PASTURE.

Kansas Experiment Station:—"On May 10, 1899, twenty-one cows out of the Agricultural College scrub herd were divided into two lots of ten and eleven cows respectively, one lot to be fed on green soiling crops and the other lot kept on pasture. Lot 1 was giving an average daily yield of about 207 pounds of milk, and lot 2 about 206 pounds, the average test being about 3·7 per cent. butter fat. Each cow was given what grain she could eat at a profit, the average being a little over three pounds per day per head. The green feeds used were alfalfa, oats, corn, cane and Kaffir-corn. The pasture was composed of both prairie and mixed grasses. It should be noticed that timely rains made 1899 an exceptionally good season for pastures.

The following table gives the amounts of green feeds consumed by ten cows and the income per acre, after deducting the cost of grain eaten. Butter fat is figured at creamery prices and skim milk at 15 cents per 100 pounds :—

		Lbs.	Per Acre.
Alfalfa, 74 days ...	...	77,145	25dol. 26
Oats, 9 days ...	...	12,225	6dol. 81
Corn, 31 days ...	...	38,695	22dol. 79
Cane, 15½ days ...	...	22,370	15dol. 60
Kaffir Corn, 14½ days ...	...	17,550	13dol. 83
Average ...	...	...	18dol. 08

In a similar manner the pasture cows brought an income of 4dol. 23 per acre.

From these figures we find that it required an average of 116 pounds of green feed per cow per day, including what little was left as waste. It required 71 of an acre to support a cow on soiling crops 144 days. During the same period it required 3.63 acres to keep a cow on pasture. It will be noticed that alfalfa was fed seventy-four days. This was from May 10th till August 1st, except nine days the fore part of June, when the oats were fed. Where alfalfa is properly managed it can be made to produce green feed during the whole summer. The corn was fed during the month of August. Cane was fed the first half of September and Kaffir corn the last half.

The pasture cows yielded the most milk by 6,678 pounds, and the most butter fat by 280 pounds, but consumed 1,232 pounds more grain. The soiling crops brought an income above the cost of grain of 18dol. 08 per acre, while the pasture brought only 4 dol. 23 per acre. Of the soiling crops, alfalfa gave the largest returns per acre, corn next, cane third, Kaffir corn fourth, and oats fifth. The average result shows that it is possible to get over four times as much per acre by soiling as by pasturing. This does not mean that soiling always pays. It will depend largely upon the cost of labour, and the amount of pasture land a person may have. Not considering the amount of land used, our cows did the best on pasture.

Nearly every dairyman has experienced the shrinkage that comes in midsummer, when the pastures dry up and grass is scarce. It is at this time that soiling will pay and pay liberally. In what better way can a person realise from 23dol. to 25dol. per acre for his green corn or green alfalfa? When the cows look over the fence with longing eyes at the corn, the efforts usually spent in keeping the cows out of the corn had better be spent in throwing the corn over to the cows. The green corn, alfalfa, or cane growing alongside of the pasture will pay greater profits if marketed to cows in need of extra feed than if held and sold to the local grain dealer, and not only that, but it will keep up the flow of milk and increase the profits derived from dairying on dry feed next fall or winter.—*Weekly Chronicle*.

RESTRICTING IMPORTATION OF ANIMALS.

In the United States of America a law has recently been enacted by Congress for the protection of game and other birds, and for regulating the importation of foreign birds and mammals. To Dr. T. S. Palmer, of the Division of Biology in the Department of Agriculture, has been appointed the duty of supervising the administration of the Act, and he has published in a *Bulletin* of the Department an account of its provisions. An absolute veto is placed on the importation of certain injurious species of wild animals and birds, and importers must in all cases obtain special permits, applied for in advance, from the Secretary of Agriculture before a single animal can be landed. No permits are issued for shipping birds from one State to another, although in certain instances the shipment of a limited number may be allowed for breeding purposes. Permits are not required for domesticated birds, and natural history specimens for museums are also free. As heretofore, special permits will be issued in the case of the larger ruminants, in the form prescribed for domesticated animals. Among the prohibited species are included the European house-sparrow, the starling, fruit-bats or flying foxes, and the mongoose. Special inspectors are appointed to carry out the law, and to give advice in cases of difficulty. Animals or birds taken in contravention of local laws cannot legally be shipped from one State to another, and all packages containing live birds and animals must be distinctly marked with the name and address of the shipper, and with the nature of the contents.

MULE BREEDING.

An interesting experiment is being carried on at Bungaree which promises to prove of much benefit to the great thirst land of the interior of our island-continent. About seven years ago two stallion asses—one a Spanish, the other a Persian—were purchased from Mr. J. H. Angas, and these have been bred to mares of different descriptions. At first very few mules were raised, but they have proved so remarkably useful that more mares will be put to the stallion asses in future, and it is contemplated by Messrs. Hawker Bros. to import a large Poitou ass, in order to raise powerful draught mules. On the firm's northern stations mules have proved their great superiority over horses during the past years of severe drought. As a proof of their remarkable hardihood Mr. M. Hawker told me that four mules worked all through the drought on one of the firm's northern stations, and kept in good condition, while the horses that were doing nothing almost died of starvation. In carting the wool to Port Augusta mules were used, and the cost was considerably less than the same work done on the neighbouring stations, where horses were employed and where the clip was lighter. Owing to the change of water at every well and spring, horses were apt

to scour, and in a drought they soon succumb when suffering from scouring. The water appears to have no ill effect on the mules. Then again, mules last longer at work than horses do, and their legs stand work much better than do those of horses. The advantages the mule possesses as a working animal over the horse in the hot, dry north are becoming so well known that mule-raising is likely to prove a remunerative business. They are adapted to light and heavy harness work, and some of them are excellent in saddle. Many stories have been told about the ill temper and viciousness of mules, but from all I can learn from those who have had the management of them, they are just as easy to handle as horses if kindly used, and neither horse nor mule should be otherwise treated. While on the estate I saw some of the asses and a few of the mules, but they were all of a light description. To grow the sort of mule required for road work the large Poitou ass is necessary, and this breed we have not in Australia, so far as I know.—*Australasian*.

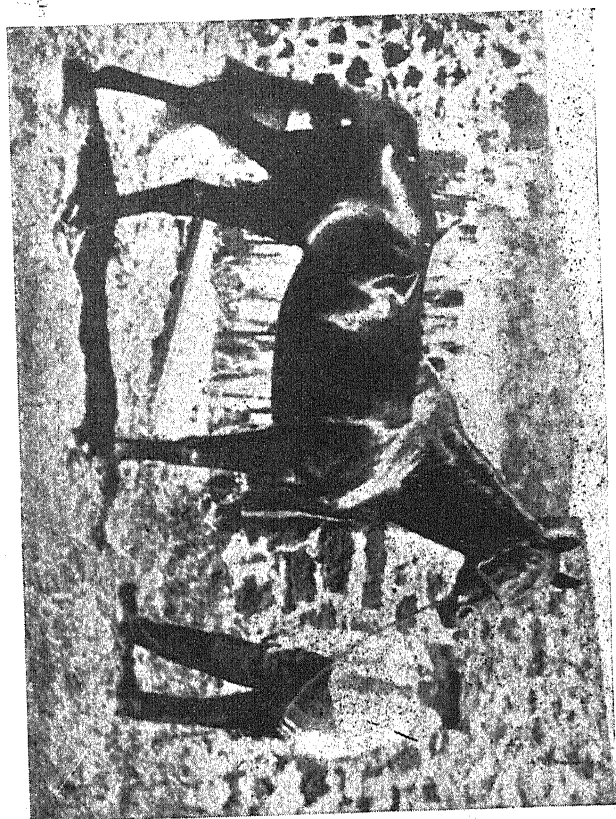
FATAL EFFECTS OF SORGHUM.

The disasters which have befallen dairy farmers through their cows eating Planters' Friend in this colony are by no means rare examples. In other countries several varieties of sorghum are labelled dangerous by farmers, particularly at certain stages. Losses have been so heavy that no risks are taken, and, as in New South Wales, cattle only suffer when they break into the fields in which the sorghum is growing. There has been much disputation as to the actual effect of the plant. Some people hold that it is poisonous; others that the fatalities are caused by gaseous inflation of the stomach. Recently experiments were made in America. A sample of cane that had produced fatal results was obtained and subjected to a careful chemical analysis. All efforts, however, to isolate and identify poisonous matter failed utterly. Although an effort was made to detect the presence of toxic substances in small quantities, it was assumed that refined, delicate tests for traces of such poison was really unnecessary, from the nature of the case. A poison that will kill a full grown animal in 10 or 15 minutes must necessarily be present in relatively large proportions. The analysis showed only a trace of potassium nitrate. Cultures made to develop toxic bacteria from the sample gave negative results. The leaves and stems of the material seemed to be free from parasitic growth. No poisonous matter, that might have been applied purposely to the leaves, was detected. All the data collected indicates plainly that first growth sorghum may prove, at times, to be just as fatal as second growth. This controverts the prevailing popular impression, but facts at hand nevertheless corroborate such a view. It is in harmony with what is known of the chemistry of all plants. The chemical substances found in plant tissues are characteristic of the plant, and are found in its various stages of growth.—*Sydney Mail*.

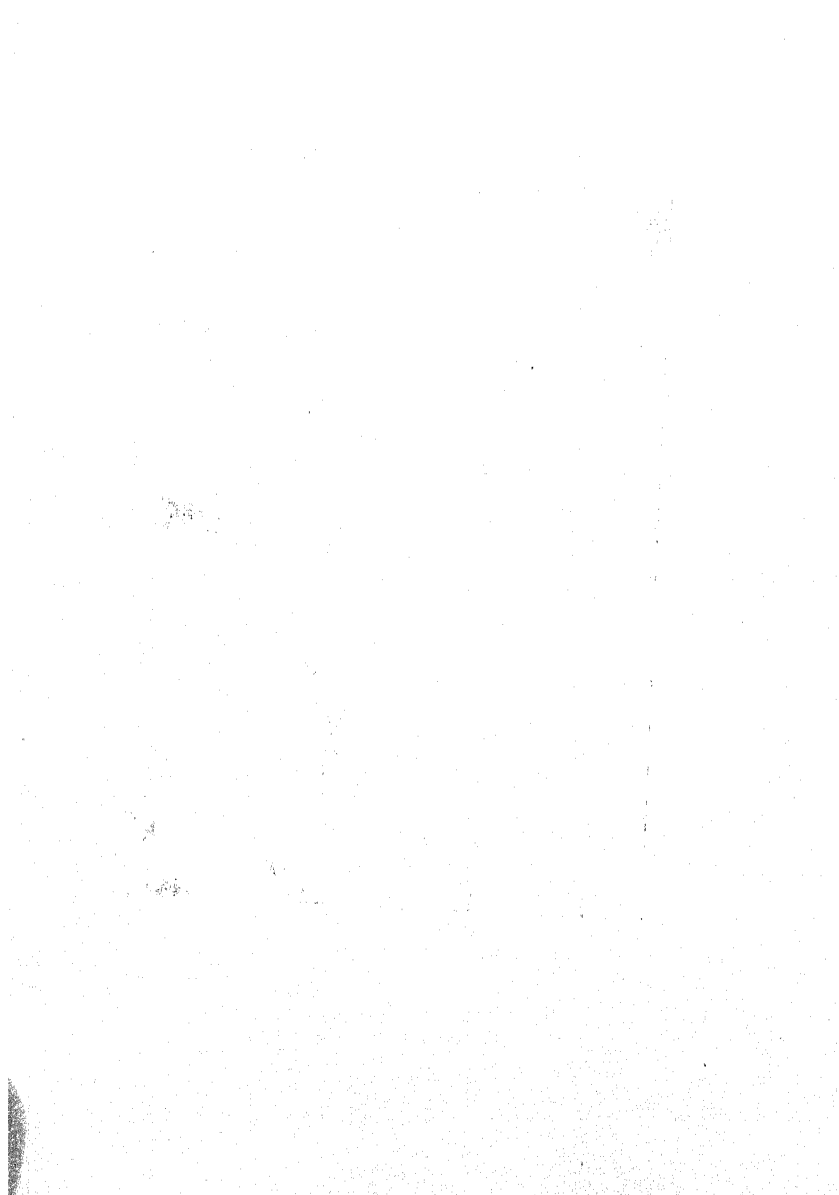
THE STRUGGLE FOR THE ENGLISH BUTTER MARKET.

A French view of the English butter market is furnished in a comprehensive paper which M. de Loverde has communicated to the Societe Nationale d'Agriculture de France. Twenty years ago France stood at the head of the countries which exported butter to Great Britain. At the middle of the century, about 1845, exports of butter from France were insignificant. They commenced to acquire importance in 1855, exceeded 15 million kilogs. 10 years later, and arrived at a maximum of 30 million kilogs. (66 million lb.) in 1876. There was little decline from this level till 1893, since which year, however, it has been very marked. The result is that whereas France formerly supplied one-third of the British imports of butter, she contributes to-day only one-tenth. Meanwhile, butter from the British colonies has established a footing in the markets of the mother country, and the English have naturally encouraged this colonial trade. Immense efforts have been made in Australia to secure this business. In Victoria free instruction in dairying is provided by the Government, which encourages the formation of syndicates and the establishment of butter factories, and prohibits the exportation of inferior grades of butter to London. The butters of Australia and New Zealand arrive in London wrapped in parchment paper and hermetically closed in 56lb. boxes. They are presented in an appetising fashion, and, owing to the employment of cold storage, they retain their natural aroma. The Canadians rival the efforts of the Australians, and it is alleged that they are even lessening their output of Cheddar cheese in order to manufacture more butter. The Canadian butter is of excellent quality, and commands the same prices in England as the other colonial butters. The seasons, moreover, do not clash, as the Canadian butter arrives after that from the Antipodes. As to other American sources of supply, Argentina now sends over two million pounds of butter to England yearly, the arrivals coinciding with those from Australasia. They make the same price as the latter, but are considered by the big merchants to possess superior quality. The exports from the United States to England are nearly eight times as large as those from the Argentine, and they arrive simultaneously with those from Canada. The quality of the United States butter does not generally commend it for purposes of direct consumption, but it is largely used by confectioners and pastry cooks.

Coming to European countries, we find that the shipments of Russian butter to England are increasing in importance year by year. In order to foster this industry the Russian Government sent specialists to Denmark to enquire into the circumstances attending the remarkable development of the butter industry in that country. On their return home they became itinerant



NEWMARRACARRA ESTATE.
"Richmond" (Richmond—Serenity).



instructors in the dairying districts of Russia, and their operations have now extended even to Asiatic Russia. Beyond the Urals, indeed, the dairying industry is developing so rapidly that the Government have organised a service of butter trains from Omsk, the capital of Western Siberia, to St. Petersburg. The distance is about 2,200 miles, and the journey occupies seven days. The trains are made up of cars specially constructed to carry ice in their sides or walls, the ice, of which there is a superabundance, being replenished at different points along the route. By this means Siberian butter reaches the Russian capital in perfect condition, and ready for immediate consumption at the table. In Sweden the butter industry receives the support of large numbers of co-operative dairies, some of which are conducted entirely by women. They are subsidised by the Swedish Government to the extent of 70,000f. per annum. The country possesses about one and a half million milch cows, and a third of their milk is used for butter-making or cheese. Sweden exports annually to England almost as much butter as Holland, and ten times as much as Norway. The Swedish, Dutch, Russian, and some other butters are shipped in casks of 1cwt. each. The finer continental butters which are sent to England are those of Denmark, France and Italy. Thirty or 35 years ago Denmark, which now occupies by far the leading place in the English market, did nothing in the way of export trade beyond sending to Hamburg butters of very ordinary quality. Often, indeed, this butter, after being warehoused for a year, was sold at a nominal price as grease. And yet Denmark has chased the butters of Brittany out of the British markets, and threatens to do the same in the case of the Normandy butters. This rapid agricultural and commercial development of a country, of which the area does not exceed that of half a dozen of the departments of France, constitutes one of the most glorious pages of contemporary economic industry.

TRAINING COLTS.

Many promising colts fail to meet the expectations of their breeders, fail to fulfil their early promise, says D. W. Thomas, in *Ohio Farmer*. The horse is too sensitive to be properly trained and controlled by brutal trainers. It is a truism that baulky drivers make baulky horses. Kindness is the best schoolmaster. Brutal force to domestic animals is nothing short of outlawed ignorance. It creates a vicious propensity in the brute to fight back in self-defence. The combat is unequal in physical strength. In the triumph of mind over the animal passions, the advantage is all on the side of the master

Many drivers spoil the young colt by ill-tempered punishment, cruel tortures to make him do what he has never learned to do by instinct or education. They resort to force before the colt has learned the nature of obedience. You might as well attempt to whip intelligence into a child as to whip it into the brute creation. The master of training must teach the colt obedience before he can expect to be obeyed. There are many professionals that are horse-killers. They break down the colt before they put him in condition to bear hard service. Whole stables have been ruined by ignorant quacks and faithless grooms. How many promising colts have been trained off in mock trials of speed, bruised to pieces in ill-advised, fruitless attempts to perform great tasks, when the colt was not in the shadow of condition to perform the service required?

How much does it cost the unfortunate owner to train his colt down to be worth nearly nothing? When the colt trains off, without any predisposing constitutional defect, we must attribute it to ignorance of the art of training. The object in training the colt is to produce dexterity in his movements. He is conditioned to perform more labor with less injury in the same time. Exercise and wholesome food are the agents to increase the natural powers of the horse. Artificial cultivation is the process by which speed, stoutness, and endurance are conferred. The art of training produces a change in the physical organs of vital forces. It expands the air tubes, clears the wind, hardens the muscles, invigorates the body, increases the circulation of the blood—the vital fluid that contributes to the force of action.

To bring the horse to the highest condition to stand the utmost exertions constitutes the art of training. It requires patience and kindness to teach the colt to keep up the utmost exertions, or stay the distance. If he should be abused or overtaxed he will become discouraged, quit, or bolt the track in self defence. Any bad habit once acquired would injure his prospects and diminish his future value. Young colts have speed, but are deficient in staying qualities. There is no objection to teaching them to show what they have got, provided the distance is limited down to their ability to perform without distress. He must be kept in spirit to do his work cheerfully when called upon. He may do it with all his might, but must have something left in him. It must not be all driven out of him. If you break his heart, there will be nothing left worth preserving.

The young colt must be encouraged to establish a good pace with perfectly true, undeviating action, to insure speed. When he shows a clean, open, perfect stride, let well enough alone. If the driver forces the colt over himself, he will naturally contract the habit of hitching and hobbling, and he will lose the advantage of a trotter. Skippers seldom stay well if they are not ruled out.

Square trotting is worth more than buck-jumping, shuffling, or any other mixed gait known in the annals of the turf. It takes longer to break up a bad habit than it does to learn it. The value of the colt is determined by his superior speed, and beautiful action. The pace is established or greatly improved in the act of breaking in. It is important that the trainer should understand his art of taming the colt and fixing his pace, for upon this depends his future usefulness.

Bitting, to soften the mouth and supple the neck, is the first process to tame the colt. The head should not be left strained up long at one time, without being let down to rest at the first onset. It makes a more sensitive and pliable mouth. If left strained up all day there is danger of making the subject hog-mouthed. After bitting the wild colt at successive intervals of 30 minutes for two or three days, his neck may be suppled by hard exercise till he yields implicit obedience to the bit and will turn, go backward or forward, at the slightest indication of the hand. The trainer is then master of the situation. He can then drive him in the harness without a load till he becomes as docile as a lamb. To save time, he can hitch him up with a well broken horse, who will help break him, and will teach him by example to draw at a load. If the youngster is not overloaded or disheartened by repeated provocations from ill-tempered drivers, he will be true as steel.

Colts are not naturally vicious. Their first impulse is to obey the commands of their superiors. It is only after desperate efforts to break away from the wanton infliction of brutal drivers, and avoid the abuse of good will by untutored ignorance, that the horse shuts up in self-defence and refuses to work.

BOONOKÉ SHEEP IN WEST AUSTRALIA.

Probably the most valuable draft of stud rams ever imported into this district, 15 in number, has just been landed at Geraldton, to the order of Messrs. W. & S. Burges. These sheep, which go to The Bowes, were specially selected from Mr. F. Falkiner's Boonoke station, Riverina—the finest pastoral country in the known world. Mr. Falkiner is one of the most successful breeders in the Southern Hemisphere; and the Messrs. Burges's importations fully sustain the reputation of the well known Boonoke stud. Four of these rams are to be exhibited at the forthcoming Geraldton show. One of them, a truly magnificent sheep in every respect, was specially imported to compete with Mr. Grant's champion 100-guinea ram of last season, and there is considerable comment in squatting circles as to the merits of the two animals. The balance

of the consignment has just been shorn, averaging within a fraction of 16 lb. of clean high-class wool—two of them cutting 20 lb. and 21 lb. respectively. The Messrs. Burges, who spare no expense where the improvement of their flocks is concerned, and whose wool invariably tops the market, are to be congratulated upon their enterprise. Mr Falkiner is desirous of entering 25 two-tooth ewes for the competition at next year's Forbes show which has been referred to in this column. He states that he is willing to pool £50 if the other competitors, Messrs. Horsfall, Gatenby, and Edols and Co. will allow him to come in. The inclusion of the Boonoke sheep in the event would add considerably to its interest for breeders. The sheep are shorn, and in all probability the originators of the competition would have no objection to another entry being made.—*Geraldton Express*.

CROPS TO SOW IN OCTOBER.

BY PERCY G. WICKEN.

As much sowing as possible should be done during this month, so as to get the seeds up and well started before the hot, dry weather comes on. Keep the ground well worked between the rows, and keep all crops free from weeds.

BEANS (French or Kidney). These vegetable are of great value during the summer, and are very prolific. A few rows should be planted out every few weeks, so that fresh ones are always coming on. There are several varieties of dwarf beans, also scarlet runners and snake beans and many other varieties which may be profitably grown. Beans being a leguminous crop require phosphatic and potash manures, which may be applied in the form of Thomas phosphate powder, kainiat or sulphate of potash. A good way to apply the manure is to spread it on the ground just before hilling up the rows. Lime is also beneficial. Plant in drills 30 to 36 inches apart, and drop about 16 inches apart in the drills. The runner beans will require to be staked as soon as they are a few inches high.

BEANS (Lima). This is a most valuable bean and of high nutritious qualities. It can be either eaten green, the same as peas, or the beans dried and used as haricot beans during the winter. It is a most delicious vegetable, and should be much more cultivated than it is. Plant same as French beans, but in drills 4ft. apart and 1½ft. apart in the drills.

BEANS (Madagascar). This is called the poor man's bean. It is a very prolific, hardy bean, and a splendid climber. It is of

great use for training along a fence, and will supply a large quantity of beans in the hot, dry weather. The whole pod is eaten the same as the French bean. It is rather strong flavored, but is much relished by many people.

BEETS (Red). A few may now be sown. It is advisable to soak the seed before planting.

BET (Silver). Sometimes known as spinach. The tops of this plant are eaten and are very good for a change. They require plenty of stable manure to encourage the growth of tops.

CABBAGE AND CAULIFLOWER. A few plants may be put out from a seed bed for table use later on.

CARROT. Sow a few drills in land that has been well worked, but do not apply manure, as the roots will become forked. Plant in land that was well manured for the previous crop.

CUCUMBER. A few hills may still be planted out so as to keep some cucumbers coming on for the table during the hot weather.

LETTUCE. Plant out a few from seed beds and make seed beds for future use. They will require to be watered when planted out. Liquid manure is desirable if it can be obtained.

MELONS (Rock, Water and Preserving). Plant as many as possible.

ONIONS. Sow a little seed and keep those growing cultivated.

PARSNIPS. Sow a little seed in deeply worked ground.

POTATOES. If not already planted, plant as many as possible. Full directions for planting, etc., were given in an article in the June number of the *JOURNAL* of the Department of Agriculture.

PEAS. Now is the time to sow peas for those who intend to plant for the Christmas market.

PUMPKINS (Squashes). Sow as many as possible. What are not used will do to store for next winter.

TOMATO. Put out as many plants as you can obtain of this wholesome fruit. They require very little attention. Manure well, and look out for the worms on the young plants.

FARM. This is an exceptionally busy month on the farm. Most of the summer crops require to be sown, and the farmer wants to make the best use of his time. By the end of the month all melons, pumpkins, potatoes, maize, etc., should be sown. Cow-peas, sorghums, millets, mangels, bokhara clover, pigeon pea, soy beans, lucerne, grass seeds, etc., may all be put in this month. This having been a very prolific season, advantage should be taken by all stock owners to make a small stack of ensilage, which can be kept until a drought comes along and it is required. Almost any green crops, or weeds, thistles, and anything obtainable, can be used for the purpose, and it can be made at very little expense.

ANSWERS TO CORRESPONDENTS.

Mr. W. J. Morrison, Perth, writes: I would like to ask through the Inquiry column of the JOURNAL what is the right thing to do in the training of vines where young shoots appear which are not desired when young grapes are on the vines, is it right to rub them off as they appear or to leave them till later on? This was submitted to Mr. J. A. Despiessis, the Viticultural Expert, who replies as follows: "Pull up suckers and water shoots as soon as they appear, also rub off unnecessary shoots growing on old wood, unless a spur or rod is required where it is showing. November is suggested as a suitable time for summer pruning, whenever a fair area of vineyard is cultivated, as it is not practicable to have a man going round the vines continuously through the earlier part of the season, which is generally a particularly busy one. After November, it is less likely that the vines will throw more suckers and shoots, and if the work is then done, it is less likely that it will have to be repeated. When the number of spurs and rods left are proportionate to the strength of the vine, the unnecessary shoots are so few that the work of disbudding can well be omitted."

Mr. A. F. Clifton, Brunswick, writes: I would be much obliged for any information you can give me with reference to the use of whale oil soap as a spray against scale and other pests on fruit trees. The Viticultural Expert says: "Whale oil soap is used in strength varying from 2lb. per gallon to 1lb. per 5 gallons of water. In the first case, it is rubbed on with a brush on deciduous trees, in the winter, as a remedy against some of the worst orchard scales. This soap is made with caustic potash, and this is not only useful as an insecticide, but is also beneficial to the tree in cleansing its bark of mosses, and imparting to it a healthy glossy appearance. The only drawback against its use is its high price in this country."

Mr. M. Lavelle, Northam, writes: I have lately leased an orchard, and I notice some of the orange and lemon trees turning black, the leaves have a sort of scale on them. I would be glad if you could advise what remedy to use to clear the same. The Viticultural Expert replies: "The trees are no doubt overgrown by the sooty mould which follows the attack of scales or aphides. Spray the tree with the following:—Starch, $\frac{1}{2}$ lb.; soft soap, $\frac{1}{2}$ lb.; kerosene, $\frac{1}{2}$ pt.; water, 1 gallon. Boil the soft soap and starch in a little water. Whilst boiling hot, pour in the kerosene, but do not do this while on the fire, churn well for a few minutes, and then spray. After two or three weeks the film of starch left on the leaves will flake and be blown away, and the trees will be clean."

Mrs. M. Richardson, Claremont, writes: Can you tell me what is the matter with my fowls? I have lost several good ones. A beautiful turkey died last week, they seem to get sick and die almost at once. The fowls make a rattling noise in the throat, but the turkey did not, but just got mopey and died. Mr. A. Crawford, the Poultry Expert, replies: "The disease is probably a form of roup, and is very infectious. As soon as a fowl shows any symptoms, it should be at once separated from the others in a place free from draught, and fed entirely on soft food. A bottle of the following dressing should be obtained from the chemist:—Carbolic acid, 1 drachm; sulphurous acid, 3 drachms; tincture of perchloride of iron, $\frac{1}{2}$ oz.; glycerine, $\frac{1}{2}$ oz. With a small brush touch all the swelled and sore parts morning and evening. Give the bird from half to one teaspoonful of Epsom salts, and six hours after begin to give one quarter adult doses of ordinary chlorate of potash and perchloride of iron mixture, give the doses night and morning. If the birds are very weak, give a little brandy with their soft food. To act as a preventive among the other fowls, add a quarter of an ounce of sulphate of iron to two quarts of their drinking water."

Mr. G. E. Dilley, Capel, writes: Please find herewith some leaves which are affected. Would you kindly advise me whether they are diseased, and if so, what will cure them? The Viticultural Expert says: "This is the leaf scab of the lemon, generally found in low and damp situations. In Queensland a red mite has been found associated with the disease, but it is not proved that it is in any way connected with it. Spray trees with Bordeaux mixture, summer strength, and sulphur the trees in summer for mites, should they appear."

MARKET REPORT.

FOR MONTH ENDING OCTOBER 11TH.

The West Australian General Produce Company report sales effected for the following articles on account of various consignees, for the four weeks ending October 11, 1900:—The markets have been moderately active during the month, and business generally is on a satisfactory basis. The prospects of a good season indicates that further improvement should take place in the condition of the colony, the effects of good returns to the producing interest being universally felt. Bacon sides and flitches selling well, stock on spot very fair, values f.o.b. firm. Hams, rather slow of sale. Butter, very good supplies on spot, and consignments arriving regular and of good quality, sales keeping up to the usual average. Lard, in 11b. patent lids tins, and without doubt excellent quality, selling very well, especially for country requirements. Cheese, very good demand for new season mild lots, only a limited quantity offering. Eggs, local, the glutted state of the market for the few past weeks is now completely over, consequently prices are firming, and a further rise is expected. Potatoes, several consignments forward from Victoria, Tasmania, and New Zealand, values as hitherto, and considering the lateness of the season quality very good. Onions still unaltered in value. Chaff, consignments forward on the increase, buyers operating very cautiously, practically purchasing for absolute requirements, anticipating further fall. Bran and pollard, stocks very fair, values as hitherto, with no immediate change expected. Flour, local, meets with good demand, the mills having to work night and day to execute orders. Oats and other grain stuffs unchanged in values, and no material alteration expected until the forthcoming new crops. Fruit and vegetables continue scarce, prices ruling very high, and needless to say consignments would sell quickly. Poultry is still scarce, and few lots forward sold well. Many inquiries for turkeys. Corn sacks, very lively market reported in Melbourne, and owing to the heavy demand expected for harvest requirements buyers should lose no time in securing what bags they require. Fruit cases, good demand. Farm and Dairy produce:—Bacon, sides, case lots, 9½d to 10d, less quantities 10d to 10½d lb; bacon, flitches, case lots, 9½d to 10½d, less quantities 10d lb; hams, 10½d, 11d, 1s. 1s 1d to 1s 2d lb; butter, Victorian and S.A. factory, 1s 1d to 1s 1½d lb; lard, 11b tins, 9½d, 21b to 41b 9d; cheese, loaf size, case lots, 9½d, medium 8½d lb; eggs, local, 1s to 1s 3d doz; potatoes, imported, £5 15s to £6 10s ton; potatoes, local, new, £7 10s to £9 ton; onions, £13 ton; chaff, worth £6 10s to £7 ton; hay, worth £5 to £5 10s ton; straw, £4 5s to £4 10s ton; bran, £6 5s to £6 15s; pollard, £6 7s 6d to £7 ton; flour, local, sacks, £9 10s to £9 15s, quarters £9 15s to £10; oats, N.Z., 3s 3d to 3s 6d bushel; maize, whole, 5s 6d to 7s bushel; wheat, 4s, 4s 3d to 4s 6d bushel; oil cake, £7 ton; peas, dry, 5s 6d bushel. Fruit.—Oranges, nominally worth 15s to 16s 6d case; lemons, nominally worth 12s to 16s case; loquats, 5d to 6d lb; bananas, 24s to 27s 6d case; passion fruit, 18s to 21s case; Cape gooseberries, 5d to 6d lb; strawberries, worth 1s 6d to 2s lb. Vegetables.—Cabbage, 8s to 10s cwt; carrots, worth 1s 6d to 2s doz bunches; parsnips, 2s doz bunches; turnips, white, 1s 6d doz bunches, bulk 5s cwt; turnips, Swedes, large size, 6s 6d to 7s 6d, small 3s 6d cwt; peas, green, 1½d to 2d lb, falling market; rhubarb, 3d to 4d lb; capsicums and chillies, 1s lb. Salads and Herbs.—Lettuce, worth 8d to 1s 3d dozen; spring onions, worth 1s 6d to 2s doz bunches; beetroot, worth 2s to 2s 6d doz bunches; celery, 1s 6d to 2s 9d doz heads; cress, worth

6d lb; thyme, marjorum, sage, dried off stalk, 9d lb; mint, dried off stalk, 6d lb; sweet basil, sweet fennell, dried off stalk, 1s 6d lb. Poultry, table fowls, young, 6s 6d to 7s 6d pair; chickens, 3s to 4s pair; ducks, 7s 6d to 8s 6d pair; ducklings, 3s 9d to 4s pair; geese, 12s to 13s pair; turkeys, gobblers, 24s to 27s 6d pair; hens, 18s to 21s pair. Carcase Meat.—Pork, 40lb to 50lb 6d lb. Mutton, lamb, beef, weather getting too warm for consignments. Veal, worth 8s. Sundries.—Bonedust, £6 10s to £7 ton; phosphate, £4 10s to £5 10s ton; superphosphate, £6 10s to £7 ton; guano phosphatic, £3 15s to £4 10s ton; guano ammonical, £6 ton; coarse bacon salt, £3 ton; new corn sacks 7s 6d, second hand 4s 6d doz; new bran bags 4s 7d, second hand 3s doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING SEPTEMBER, 1900.

The weather was fairly seasonable on the whole. In the extreme S.W. and S. it was unusually wet, but elsewhere the rainfall was about the same as the mean for previous years. There were no continuous periods of wet weather, but there were the usual alternations of sun and showers, the latter being mostly confined to the coastal districts. About the 20th an anti-cyclone commenced to form over the southern portions of the colony, giving some very cold frosty weather. The maximum pressure occurred on the 22nd and 23rd, after which the temperature rose steadily as the anti-cyclone receded eastwards, reaching the unusual height of 87·6 in the Perth Gardens on the 28th, a reading that has only once been exceeded in September since records commenced in 1876. Some rather low temperatures were recorded on the surface of the ground, the minima being :—

Cue	...	...	...	32·0 on the 14th.
Coolgardie	...	...	...	29·6 on the 1st.
Southern Cross	...	...	...	28·8 on the 22nd.
York	...	...	...	28·0 on the 22nd.
Perth Observatory	...	...	...	33·2 on the 14th.
Karridale	...	...	...	29·0 on the 1st.
Katanning	...	...	...	26·5 on the 1st.

Snow was recorded at many places on the 17th.

THE CLIMATE OF WESTERN AUSTRALIA.

DURING SEPTEMBER, 1900.

FROM TELEGRAPHIC REPORTS.

LOCALITY.	Barometer (corrected and reduced to Sea Level).		Temperature.			Rainfall.	
	High- est	Lowest	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	30.648	29.771	87.0	103.5	72.0	nil	1254
Derby	30.0	29.799	80.2	100.0	54.5	nil	1407
Broome	120	853	77.2	97.0	56.4	nil	1810
Condon	173	861	69.4	94.0	42.0	8	1892
Cossack	214	872	72.0	93.2	51.8	nil	4008
Onslow	111	918	68.4	94.5	43.5	1	2696
Carnarvon	289	952	64.8	95.7	43.0	21	1466
Hamelin Pool	334	908	63.8	92.2	40.0	28	799
Geraldton	353	817	60.2	94.0	39.0	81	2039
Hall's Creek	165	758	77.2	99.8	50.0	nil	1465
Nullagine	280	760	68.5	91.0	40.0	nil	1550
Peak Hill	325	951	61.4	87.8	38.1	7	2458
Lake Way							
Cue	390	807	60.0	89.8	37.0	8	1941
Yalgoo	393	743	58.8	90.2	35.9	13	1183
Lawlers	429	786	57.7	88.6	34.7	1	1395
Lawerton	494	780	55.7	90.2	35.0	22	1474
Menzies	503	735	56.1	89.0	37.1	28	1051
Kalgoorlie	558	701	56.0	90.5	37.5	34	965
Coolgardie	558	638	55.4	90.0	35.7	77	900
Southern Cross	514	630	54.8	82.8	33.0	59	891
York	521	578	53.0	85.2	31.8	183	1891
Perth Gardens	530	640	58.1	87.6	38.4	252	3260
Perth Observatory	536	653	57.0	86.6	38.6	230	3305
Fremantle	509	621	57.7	82.4	42.4	152	2494
Rottnest	493	589	58.1	83.0	42.6	191	2406
Bunbury	514	532	55.8	76.5	37.2	380	3774
Karridale	502	496	54.2	81.5	33.0	599	4725
Cape Leeuwin	506	439	57.1	76.4	45.0	433	3778
Katanning	509	581	51.6	81.1	33.5	166	1666
Albany	513	513	54.4	85.4	35.0	348	3272
Breaksea Island	513	492	55.0	84.2	32.0	188	2382
Esperance Bay	527	429	55.4	86.6	38.8	227	2449
Balladonia							
Eyre	468	398	55.4	92.9	34.2	299	1536

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

RAINFALL for August, 1900 (completed as far as possible),
and for Sept., 1900 (principally from Telegraphic Reports).

STATIONS.	AUGUST.		SEPT.		STATIONS.	AUGUST.		SEPT.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	Nil	..	Nil	..	Millstream ..	..	..	..	..
6-Mile Hotel ..	..	..	..	..	Hong Kong ..	Nil	..	..	..
Carlton ..	..	..	..	..	Mallina ..	..	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	Nil	..
Rosewood Downs	Nil	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	..	..	..	..
Lisadell ..	Nil	..	..	..	Croydon ..	Nil	..	..	..
Turkey Creek ..	Nil	..	Nil	..	Balla Balla ..	Nil	..	Nil	..
Ord River ..	Nil	..	..	..	Roebourne ..	Nil	..	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	Nil	..	Nil	..	Fortescue ..	Nil	..	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	..	..	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	..	..	..	..
Denison Downs..	..	..	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY:					Chinginarra ..	..	..	..	..
Obagama ..	..	..	..	..	Onslow ..	8	1	1	1
Derby ..	Nil	..	Nil	..	Peedamullah ..	..	..	..	..
Yeeda ..	Nil	..	..	..	Clifton Downs	46	6	..	..
Liveringa ..	..	..	..	..	Red Hill ..	..	..	..	..
Mt. Anderson ..	..	..	..	..	Wogoola ..	..	..	..	..
Leopold Downs ..	..	..	..	..	Yanrey ..	..	..	..	..
Fitzroy Crossing	Nil	..	Nil	..	Point Cloates ..	72	..	..	..
Quanbun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	40	4	7	1
Broome ..	Nil	..	Nil	..	Towara ..	..	..	..	..
Thanoo ..	..	..	..	..	Ullawarra ..	..	..	..	..
La Grange Bay..	Nil	..	Nil	..	Woorkadjia ..	..	2	..	..
NORTH-WEST:					Yanyearddy ..	28	1	..	..
Wallal ..	Nil	..	6	2	Williambury ..	18	2	..	..
Condon ..	Nil	..	8	..	Wandagee ..	..	..	..	..
DeGrey River ..	Nil	..	..	..	Boolathana ..	62	5	..	..
Port Hedland ..	Nil	..	Nil	..	Carnarvon ..	45	7	21	..
Boodarie ..	Nil	..	..	..	Cooralya ..	..	..	..	..
Yule River ..	..	..	..	..	Doorawarra ..	..	..	..	..
Warralong ..	..	..	..	..	Mungarra ..	..	..	..	..
Muccan ..	..	..	..	..	Errivilla ..	24	2	..	..
Mulgie ..	..	..	..	..	Dirk Hartog Is...	125	6	..	..
Eel Creek ..	..	..	..	..	Sharks Bay ..	109	7	12	1
Coongon ..	..	..	..	..	Kararang ..	146	7	..	..
Warrawagine ..	..	..	..	..	Meedo ..	60	5	..	..
Bamboo Creek ..	Nil	..	Nil	..	Wooramel ..	100	4	Nil	..
Marble Bar ..	Nil	..	1	1	Hamelin Pool ..	81	6	28	2
Warrawoona ..	Nil	..	Nil	..	Byro ..	36	4	..	..
Corunna Downs	Nil	..	..	..	Berringarra ..	..	..	..	..
Nullagine ..	Nil	..	Nil	..	Mt. Gould ..	9	1	..	..
Tambourah ..	Nil	..	Nil	..	Peak Hill ..	16	2	7	..
Mt. Florence ..	..	..	..	..	Abbotts ..	24	6	3	1
Tambrey ..	..	..	..	..	Belele ..	Nil	..	..	..
					Mileura ..	13	1	..	..

RAINFALL.—Continued.

STATIONS.	AUGUST.		SEPT.		STATIONS.	AUGUST.		SEP.	
	No. of points. 100 equals lin.	No of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE--Cont.					SOUTH-WEST DIVI-				
Manfred ..	41	4	..	..	SION, CENTRAL				
Mellya ..	107	5	..	..	(COASTAL):				
Woogarang ..	70	5	..	..	Gingin ..	1030	23	460	9
Wooleane ..	69	1	..	..	Belvoir ..	802	21	..	..
Dairy Creek ..	80	3	..	..	Mundaring ..	903	24	..	..
Murgoo ..	59	5	..	..	Guildford ..	871	25	331	9
Mt. Wittenoom ..	71	4	..	..	Canning Timber				
Nannine ..	25	4	2	..	Mills ..	1238	25	457	9
Star of the East	75	4	1	1	Kallyamba ..	783	20	254	11
Annean ..	19	2	..	..	Canning Water-				
Tuckanarra ..	43	5	Nil	..	works ..	1002	24	370	8
Coodardy ..	48	5	Nil	..	Perth Gardens ..	786	26	252	11
Cue ..	41	4	8	2	„ Observatory	797	27	230	11
Day Dawn ..	23	3	5	2	Subiaco ..	721	26	228	11
Lake Austin ..	34	5	5	2	Claremont ..	780	27	279	10
Lemmonville ..	55	7	25	3	„ (Richardson)	732	25	..	..
Mt. Magnet ..	65	7	25	3	Fremantle ..	638	27	152	10
Challa ..	45	3	..	..	Rottnest ..	486	27	191	10
Youeragabbie ..	47	2	..	..	Rockingham ..	687	24	220	8
Yalgoo ..	81	7	13	3	Jarrahdale ..	1050	23	..	..
Gabyon ..	63	3	..	..	Mandurah ..	707	26	408	9
Gullewa ..	122	12	53	6	Pinjarrah ..	761	21	287	7
					Harvey ..	780	23	332	8
SOUTH-WEST DIVI-					SOUTH-WEST, CEN-				
SION (N'N PART):					TRAL PART (IN-				
Murchison House	288	13	..	..	LAND):				
Mt. View ..	262	20	82	8	Goomalling ..	304	8	..	..
Yuin ..	115	7	..	..	Culham ..	456	20	223	8
Northampton ..	467	11	78	4	Newcastle ..	621	19	253	8
Mt. Erin ..	369	12	..	..	Eumalga ..	538	21	262	8
Oakabella ..	442	14	..	..	Northam ..	298	19	181	7
Narra Tarra ..	474	13	94	2	Grass Valley ..	294	18	165	6
Tibradden ..	488	12	151	..	Meckering ..	266	18	164	8
Sand Springs ..	..	..	187	8	Doongin ..	244	12	138	6
Mullewa ..	171	7	35	..	Whitehaven ..	..	..	..	..
Bootenal ..	261	10	..	..	Sunset Hill ..	275	16	163	6
Geraldton ..	243	15	81	..	Cobham ..	365	23	181	10
Greenough ..	336	14	151	5	York ..	360	19	183	..
Dongara ..	240	17	117	7	Beverley ..	246	13	..	..
Dongara (Pearse)	221	15	112	7	Barrington ..	280	16	167	8
Strawberry ..	..	..	152	7	Sunning Hill ..	342	14	..	..
Mingnew ..	376	16	169	8	Wandering ..	539	20	328	9
Rothsay ..	159	13	..	..	Pingelly ..	284	18	160	7
Field's Find ..	66	5	..	..	Marradong ..	595	16	278	11
Carnamah ..	284	18	95	9	Bannister ..	578	18	327	9
Watheroo ..	281	18	133	6	Narrogin ..	272	21	167	8
Dandaragan ..	628	20	201	7	Wickepin ..	323	13	162	10
Moora ..	339	18	165	8					
Yatheroo ..	750	20	281	8	SOUTH-WEST DIVI-				
Walebing ..	431	20	211	8	SION (S'N PART):				
New Norcia ..	542	19	221	8	Bunbury ..	685	24	380	13

RAINFALL.—Continued.

STATIONS.	AUGUST.		SEPT.		STATIONS.	AUGUST.		SEPT.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST--Cont.					EASTERN DIVISION.				
Donny Brook ..	926	25	332	11	—Continued.				
Boyanup ..	750	25	341	12	Mt. Morgan ..	29	5	15	1
Busselton ..	689	27	312	14	Laverton ..	20	5	22	2
Quindalup ..	794	14	445	7	Murrin Murrin ..	28	5	9	2
Margaret River..	824	22	556	15	Pendennie ..	16	3	26	3
Lower Blackwood	940	27	500	9	Tampa ..	16	3	5	1
Karridale ..	731	26	599	17	Niagara ..	8	1	11	1
Cape Leeuwin ..	525	30	433	18	Yerilla ..	18	4	16	3
The Warren ..	1173	28	656	15	Edjudina ..	31	4	..	..
Lake Muir ..	614	27	383	18	Menzies ..	27	6	28	..
Mordalup ..	622	30	..	..	Goongarrie ..	30	3	22	2
Riverside ..	701	30	..	..	Kurawa ..	41	5	23	2
Balbarup ..	785	29	435	13	Dixie Mine ..	44	6	..	..
Wilgerup ..	..	..	475	15	Kurnalpi ..	66	10	72	3
Mandalup ..	1005	25	..	..	Bulong ..	41	8	53	4
Bridgetown ..	859	30	384	14	Kanowna ..	62	11	38	4
Greenbushes ..	943	27	406	11	Kaloorlie ..	61	9	34	2
Williams ..	430	18	195	9	Coolgardie ..	74	12	77	4
Arthur ..	332	18	190	10	Burbanks ..	69	7	84	5
Darkan ..	480	19	..	..	Londonderry ..	68	8	83	6
Wagin ..	203	19	142	11	Widgiemoorltha..	77	9	87	4
Glencove ..	305	14	..	..	50-Mile Tank ..	118	11	126	7
Dyliabing ..	223	9	148	5	Norseman ..	51	11	176	6
Katanning ..	296	19	166	11	Bulla Bulling ..	96	5	59	..
Kojonup ..	409	21	237	8	Woolgangie ..	80	5	100	5
Broomehill ..	412	23	152	8	Boorabbin ..	74	9	45	6
Sunnyside ..	287	22	169	11	Karalee ..	89	6	..	..
Woodyarrup ..	224	19	173	10	Yellowdine ..	34	5	68	6
Cranbrook ..	270	20	230	11	Southern Cross..	73	7	59	5
Blackwattle ..	531	24	..	..	Mount Jackson ..	72	7	..	..
Mt. Barker ..	504	23	333	13	Bodallin ..	77	..	..	..
St. Werburgh's ..	425	25	291	12	Burracoppin ..	..	..	..	..
Forest Hill ..	537	30	352	15	Kellerberrin ..	227	12	162	8
Denmark ..	1131	29	381	..	Mangowine ..	167	8	..	..
Albany ..	752	27	348	14	EUCLA DIVISION:				
Point King ..	722	25	320	15	Coconarup ..	109	6	..	..
Breaksea ..	517	25	188	17	Fanny's Cove ..	338	19	..	..
Cape Riche ..	283	22	220	8	Park Farm ..	381	19	..	..
Pallinup ..	208	12	..	..	Esperance ..	483	18	227	..
Bremer Bay ..	330	19	186	10	Gibson's Soak ..	294	17	322	9
Jarramongup ..	181	10	..	..	30-Mile Condenser	166	4	..	..
EASTERN DIVISION:					Swan Lagoon ..	237	20	..	..
Lake Way ..	5	3	..	..	Grass Patch ..	230	20	334	11
Lawlers ..	30	6	1	1	Lynburn ..	..	..	..	..
Diorite King ..	25	3	Nil	..	Israelite Bay ..	212	13	168	9
Sturt Meadows ..	26	4	..	..	Balladonia ..	117	9	241	7
Mt. Leonora ..	38	4	8	2	Eyre ..	183	..	299	..
Mt. Malcolm ..	37	4	6	1	Eucla ..	134	10	230	10

The Observatory, Perth, 5th Oct. 1900.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF SEPTEMBER, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of																	
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomoloes.	Pines.	All other fruits.		
FREEMANTLE ..	12	24	3697	3697	..	..	..	3697	..	914	..	..	..	..	491	..	267	206	..	..	..	..	..	11	..	..
ALBANY ..	4	4	167	164	3	..	..	167	..	24	..	..	..	..	22	..	114	4	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HARVEY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	1	1	10	10	..	..	..	10	..	2	..	..	..	..	2	..	6	..	..	..	..	..	..	..	..	..
TOTAL ..	17	29	3874	3871	3	..	..	3874	..	940	..	..	..	..	518	..	279	210	..	..	..	..	..	11	..	..

DEPARTMENT OF AGRICULTURE,

5th October, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF SEPTEMBER, 1900.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.																	
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vine Cuttings.	All Other Trees.		
FREMANTLE ..	10	19	12572	19	12572	..	..	33	5847	..	140	..	..	..	..	900	..	..	700	..	..	..	..	1255000	1255000	..
ALBANY ..	1	1	140	1	140	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELLTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BURBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	11	20	12712	20	12712	34	5847	140	900	700	1255000	1255000	..

DEPARTMENT OF AGRICULTURE
5th October, 1900.



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1900.

NOTES.

CALVES BY IMPORTED BULLS.—The Department of Agriculture has recently purchased three bull calves which are the progeny of some of the Government stud bulls, from pure-bred Jersey cows. It is the intention of the Department to rear these young bulls for stud purposes.

A NEW GUTTAPERCHA.—An interesting discovery has recently been made in Zanzibar. According to our consul there, the fruit of a tree which grows principally at Dunga will, on being tapped with a knife, produce a white fluid which, when placed in boiling water, co-agulates into a substance closely resembling guttapercha; this in the process of cooling becomes hard, but can in its previous soft state be moulded into any required shape. The fruit somewhat resembles a peach in shape, but is of the size of a small melon. It is not improbable, he adds, that it will prove to be an inferior order of guttapercha.—*Globe*, August 31.

STATE EXPERIMENTAL PLOTS.—The Secretary for Agriculture is in receipt of the following report from Mr. G. F. Berthoud, manager of the State experimental plots at Drakesbrook:—"During the latter part of the past month we have had some fine warm weather. The wheats and all the winter sown crops are still very short and backward in growth, particularly the imported varieties, which are, without exception, not doing as well as they should. All from local seed are much better. Still, they are not so forward as at this stage last year, but they have plenty of time to improve before harvest time. All of the spring-sown seeds are making fine progress. I have finished planting the potatoes, etc. The cause of the backwardness of the grain crops is the excessive rain during the winter."

COOGEE AGRICULTURAL SOCIETY.—This society in writing to the Secretary, Department of Agriculture, state that they started the year with a bank balance of £51 10s. 2d., and after expending on their hall and improvements the sum of £84, they had a balance in hand of £43 7s. 4d. on September 30th, and also £12 19s. to pay into the new Treasurer. They have 30 members who have already paid up their yearly subscription. The following officers have been elected for the ensuing year. President, J. G. Rodd, Esq.; Treasurer, S. Christie, Esq.; Vice-President, J. B. Mell, Esq.; Auditors, Messrs. W. Powell and J. B. Mell; Secretary, Mr. W. H. Allen; Committee, Messrs. André, A. Meek, E. Lewington, W. Powell, E. Kennidie, with Messrs. Anderson, Eddie and Mell as show committee, in conjunction with ordinary committee.

INSPECTION OF MEAT.—The hon. veterinary surgeon to the Central Board of Health (Mr. H. H. Edwards), has reported to the Department of Agriculture in reference to the inspection of meat in the city as follows:—"In the early morning of Saturday, the 6th inst., I made an inspection of all the butchers' shops in Perth, with a view of ascertaining the quality of the meat intended for human food. The result of my tour was very satisfactory, for not only was there no evidence of disease, but the meat provided for the public was of excellent quality throughout. At the large establishments the display was well worth seeing, and in large and small shops alike, the cleanliness and care in handling were striking. There is just one matter to which attention should be drawn, and that is the evident carelessness of people in the country in killing, dressing, and conveying pigs. In their desire to provide the best article in the shape of pork, the butchers make arrangements with well-known farmers to supply them regularly. This is done, but the animals are not killed as the butcher would kill them, and, worse than this, the bag in which they are sent is not as clean as it might be. Most of the pigs seen on Saturday had been 'shouldered' in the killing, badly scalded, and were soiled through contact with the dirty bags."

RELATION OF BIRDS TO CROPS.—As to the relation of birds to crops, it appears that Dr. C. H. Merriam, chief of the division of ornithology of the Agricultural Department of America, has for many years been engaged in examining and analysing the contents of the stomachs of hawks, crows, owls, blackbirds, meadow larks, and other birds of North America which are supposed to be either beneficial or injurious to the crops of farmers. The stomachs of over 7,000 birds, taken at different seasons of the year, had been already examined and the contents determined, while there were thousands more to be analysed. The results in some cases had been remarkable, showing in notable instances, that popular ideas regarding the injurious effects of certain birds were wholly mistaken, and that the birds had been the victims of an unjust persecution. This had been found to be especially the case with hawks and owls, for the slaughter of which many of the States give bounties. Pennsylvania, for instance, in two years gave over £20,000 in hawk and owl bounties. Examination of the stomachs of these birds proved conclusively that 95 per cent. of their food was field mice, grasshoppers, crickets, &c., which were infinitely more injurious to farm crops than were the birds. It was found that only five kinds of hawks and owls ever touched poultry, and then only to a limited extent.

ALKALI GRASS.—The attention of the Secretary for Agriculture has been drawn to the advisability of procuring some seeds of the Tussock grass (*Sporobolus airoides*) from the University Experimental Station, California. Recent tests made by the botanists at this

institution prove that wherever this grass grows luxuriantly the ground is irreclaimable for ordinary crops, unless underdrained for the purpose of washing out surplus alkali salts. The grass is a useful forage for stock, and thrives in the hot arid interior of America. It has been suggested to Mr. Cowen, by Mr. P. G. Wicken, that this grass would be worth trying in the inland districts, and advises that seed should be procured. The Government botanist (Dr. Morrison) writing on this matter says:—“*Sporobolus airoides* is not found in Australia, being confined to the south-western states of North America. There are, however, six species of the *Sporobolus* growing as natives in Australia, three of these being found in Western Australia. *Sporobolus Virginicus* may be seen flourishing on the sands of the sea shore in Australia as well as in Asia, Africa, and America, spreading by means of shoots running out at some distance below the surface. It stands drought and is considered fattening, and though not a succulent grass, keeps green during the dry season. A taller variety of this grass grows in the interior also, though not recorded in this colony. *Sporobolus airoides* may be better than the local species, but it looks very wiry.”

THE MARKET FOR COLONIAL TOBACCO.—Mr. J. C. Jones, secretary of the Fremantle Co-operative Society, has sent to us a copy of the following letter, which he has addressed to the Minister of Lands:—“Fremantle, October 18th, 1900.—Hon. George Throssell, Minister of Lands—Sir,—I take the liberty of bringing under your notice the fact that the English Wholesale Co-operative Society, Manchester, is an almost unlimited buyer of colonial-grown tobacco leaf. This society has already bought from Victorian growers over 150 tons, and is unable to secure anything like a sufficient supply. Possibly this is one of the minor agricultural industries in which Western Australia might also engage. The Victorian Department of Agriculture is about to fit up in the town of Wangaratta a thoroughly-equipped store to assist the growers in further extending the industry, and a largely-increased area is being put under crop. The Government Expert says the growers are quite satisfied with the prices given by the society. The society purchases the leaf direct from the producer, ships and manufactures it into tobacco, which is retailed to the consumer through its 1,700 distributing branches, scattered throughout the United Kingdom. I may point out that the society is also doing an extensive business in other Victorian products, as the producer is at last realising the benefits of cash payments and the retention for himself of the profits and perquisites hitherto obtained by the numerous middlemen, whom the society has displaced.—I remain, etc. (Signed) J. C. Jones, Secretary Fremantle Co-operative Society.” Mr. Jones adds that he has been informed by the Department of Agriculture that tobacco-growing can be carried on in the coastal and northern districts of the colony.

SHEEP.

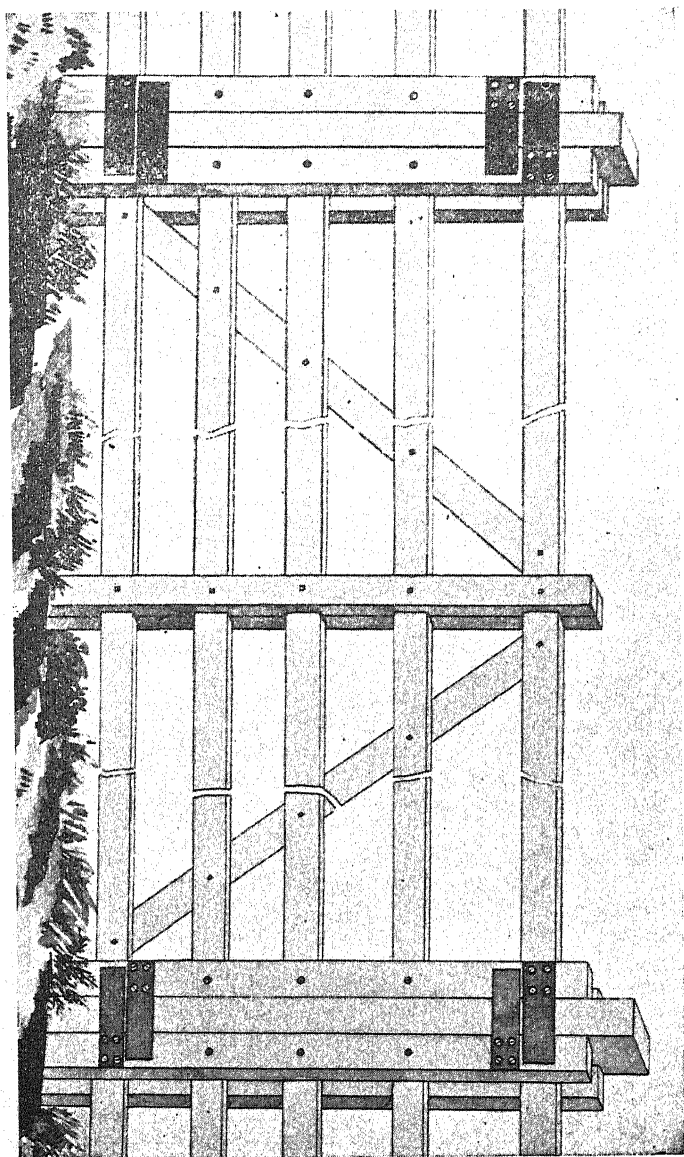
BY PERCY G. WICKEN.

Continued from page 241.

Having in previous issues given a brief resume and history of the best known breeds of sheep, I would in this issue endeavour to point out the advantage to a farmer of keeping a small number of sheep on a farm, and the profit to be derived by doing so. It must be borne in mind that there are a great number of breeds of sheep that are suitable to different climates and conditions, we often hear it said that sheep will not pay in this district, and we have given them up. The probability is that the right breed has not been tried, it does not follow that because Merino sheep will not do in a district that no other breed will. In a wet climate, under similar conditions to our South Western district, Merino sheep soon develop foot rot and liver fluke, and are useless as a profitable investment to the farmer, but you can take Romney Marsh sheep for instance, and put them on this same land, and they will not be troubled with disease. While at the Hawkesbury College I was recently engaged in carrying out a number of experiments with sheep on low-lying lands in the coastal districts. The land was sandy, and during the winter months wet and boggy; a number of Merino sheep were obtained, but they soon developed foot rot, and fell off in condition so that they had to be disposed of. It was then determined to try some other breeds, and some Romney Marsh and Shropshire Down sheep were obtained.

The Romney Marsh sheep, as stated in our last issue, are bred on the wet, low-lying districts, in the county of Kent, and are quite free from foot rot, and although the ground was very wet, and they were also turned into ploughed soft ground for the purpose of soiling, they were not attacked in the slightest degree with foot rot, and put on condition all through the winter; the Shropshire sheep also kept their condition and did not suffer from foot rot. The farmers around about the college say that sheep farming will not pay, and I do not know a farmer within miles of the college farm who keeps any sheep, but the experiment recently carried out on the college farm proves beyond all doubt that sheep farming, if properly carried out, will pay handsomely. Very mistaken ideas are held by numbers of farmers as to what constitutes sheep farming, the purchase of a few ewes and a ram, and turning out in a paddock, irrespective of locality, breed of sheep, or local conditions as to feed, etc., and to bring in at shearing time each year, is considered by some all that is required to make money out of sheep; this may be, but most probably will *not* be, a profitable undertaking. Sheep respond to care, attention, and regular feeding, as much as any other animal, anyone who has a few acres of land under cultivation should be able to have all the year round sufficient food to maintain a few sheep, and to fatten the lambs for market. Sheep are not at

PORTABLE FENCE MADE OF BATTENS, FOR ENCLOSING SHEEP FOR FATTENING.



all particular as to their tastes, and will eat almost any food given to them. When there is plenty of natural feed, they will require no attention; in the winter months when feed is perhaps scarce, the wheat will require to be eaten down, which will not only fatten the sheep, but also greatly improve the wheat crop and manure the soil, then such crops as rape, mustard, clover, leguminous crops, lucerne, all kinds of roots, may be grown and carted to sheep, but much the best way is to turn the sheep into the crop, and let them eat it down themselves, there is far less waste in this manner than if the food is carted to the sheep, as if not eaten at once, it soon dries up and becomes useless. If no other food is available the sheep will eat any kind of chaff or ensilage, and chaff made from millet and other inferior crops can be used in this manner, in fact; a little chaff fed through a self feeder, as shown in our illustration, is an advantage to the sheep at all times, no matter what feed they are on. By the use of a feeding trough like this no food is wasted, and as it is either on skids or wheels a horse can be hitched on to it, it can be drawn from one paddock to another without further trouble. During the hot, dry weather, however bad the season, sufficient green maize or sorghum can always be grown, without any trouble, to feed a few sheep. If sheep are to be fed on crops, they should not be let into too large an area of growing crops at one time, otherwise they may tramp down and destroy a large quantity of the crop. A portable hurdle fence made of battens bolted together is almost a necessity, such a fence composed of hurdles, as shown in our illustration, does not cost much, and can be either shifted by two men, if for a short distance, or carted anywhere required. In my own experiments two men with a horse and cart could shift the fence, and re-erect it round an acre block in half a day. The hurdles can be easily carried by one man, each hurdle is 10 ft. long and made of 3 in. wide by $\frac{1}{2}$ in. or $\frac{3}{8}$ in. battens bolted together, iron loops are placed on the sides of each hurdle, through which wooden stakes are driven into the ground to hold the hurdles firm. Wire netting may also be used for fences, a narrow width (say 30 inches) and broad gauge wire may be used, but it must be strongly secured, it is of advantage to have the fence easily removed, so that it can be shifted frequently to let the sheep into fresh feed. By making a fence that is both sheep and pig proof a double advantage is gained, as after the sheep have eaten a paddock down if pigs are turned into it they will, especially with root crops, find plenty to eat, and also give the ground a good rooting up. The breeds mentioned, both Romney Marsh and Shropshires, are noted fence-breakers, and require a very close fence to keep them in, a fence that is sufficient to keep Merinos in the paddock, is quite useless for these breeds.

The following experiments, recently carried out by me at the Hawkesbury College farm, give some idea of the results of fattening sheep on crops for market purposes. On June 22nd last year thirty Romney and eight Shropshire lambs were weighed and

hurdled on $\frac{1}{4}$ acre of *paspalum* grass, after eight days they were moved on to a $\frac{1}{2}$ acre plot of white mustard, when it was eaten down they were put on to an acre plot of rape. On August 1st they were weighed again, and it was found that the Shropshires had gained 30 lb. each, and the Romney's 20 $\frac{1}{4}$ lb. in 40 days.

	Romney Marsh.	Shropshire.
Number of sheep ...	30	8
Average weight on June 22nd	59 lbs.	64 $\frac{1}{2}$ lbs.
Average weight on August 1st	79 $\frac{1}{4}$ „	94 $\frac{1}{2}$ „
Gain	20 $\frac{1}{4}$ „	30 „

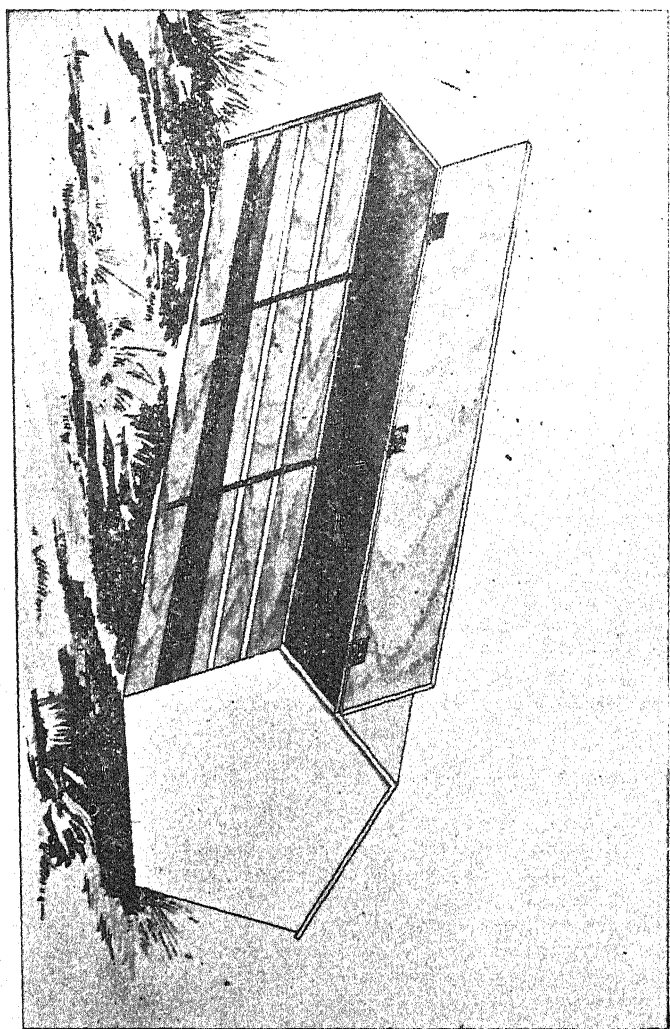
Or in other words, 38 sheep, in 40 days, converted 1 $\frac{3}{4}$ acres of green crops into 847 $\frac{1}{2}$ lbs. of mutton, and this without any expense of harvesting, 847 $\frac{1}{2}$ lbs. of mutton taken at 3d. per lb., a low value for Western Australia, means £10 11s. 10d., and I leave it to the farmer to decide as to whether it is more profitable to market the produce from his farm in the form of mutton, which can most likely be sold locally, or at any rate, at very little expense, than to market it in such a bulky form as turnips and green crops, with all the attendant haulage and expenses.

Other advantages to be gained are the yearly increase of the sheep, and also the value of the wool. Most of the crops, such as rape, mustard, lucerne, etc., make second and third growths, and can be grazed several times. The bulk of the crop is returned to the ground as manure, in the form of sheep droppings, and the soil is thereby manured and improved for the next crop. There is no expense in harvesting the crops or carting into railway or store, the land is left free from weeds, and in good order for ploughing. Another advantage, and not a small one, is that the farmer is able to have a supply of fresh, good meat for his own table, which is too often not the case. It is not a good sight to see the butchers cart as often as we do, going from farm to farm to sell meat, there is only one dealing the up-to-date farmer should have with the butcher, and that is dealing with him for the sale of fat live stock.

The question of raising sheep on farms for market purposes is largely carried out in America, and some extracts from a report which Dr. James Withcombe, assistant director of the Oregon Experimental Station, has written to the United States Department of Agriculture, may prove of interest. The conditions, due to the mild and more equitable climate in this colony should be largely in favor of our local farmers. The report as follows refers to Western Oregon, one of the North-Western States of America:—

“The flocks here are usually small and represent the mutton breeds, as mutton is more profitable than wool. Farm surroundings here are exceedingly favorable for the economical production of mutton, and marvellous growths have been secured with the mutton breeds. Possibly there are but few sections of country to which the old Spanish proverb, ‘The sheep’s hoof is golden,’ is more applicable than in this region. With wheat growing a

FEEDING TROUGH FOR SUPPLYING SHEEP WITH CHAFF.



prominent factor, mutton production will always be found a profitable supplement. These two industries go admirably together. Among live stock sheep are pre-eminently soil renovators, and, with one possible exception, that of butter, no product of the farm takes less from the land in proportion to its market value than wool and mutton. Then, again, the excreta from sheep are more perfectly utilised as fertilisers than those from any other farm animal. This is due to their comparatively even distribution over fields that are grazed by these animals.

"ANNUAL FORAGE CROPS FOR PASTURE.—In the event of the production of mutton being made strictly supplementary to grain growing, farming of more or less intensive character should be adopted. This involves the growing of clover, rape, vetches and other forage plants as rotation crops, these to be pastured off or to be harvested as hay for winter feeding. A popular method is to grow two successive grain crops, following these with clover or some cultivated crop. A good fall sheep pasture is secured by sowing three or four pounds of Dwarf Essex rape seed per acre with spring oats. The rape makes a good growth in the early part of the season and develops sufficient root growth to enable it to withstand the summer. It revives with the coming of the fall rains and often makes an excellent pasture for lambs or breeding ewes until late in the season. Some of our most progressive wheat growers take two or three consecutive crops of grain, and then seed down to clover. The first crop of clover is harvested for hay, to be fed to the flock during the winter. The clover is then pastured for one or two years with sheep; afterwards the land is broken again for grain. This practice is found to be very helpful in restoring and maintaining the fertility of the land, as well as in making wool and mutton contribute materially to the revenues of the farm.

"Another plan is to sow the fallow land to rape about the first of June. This will be ready to pasture within six weeks or two months, and the amount of forage secured from a piece of land thus treated would be a revelation to many farmers. The land is ploughed and sown to wheat about the first of October, and, in a normal season, by the following February a luxuriant pasture will be furnished for the ewes and lambs, or for fattening sheep.

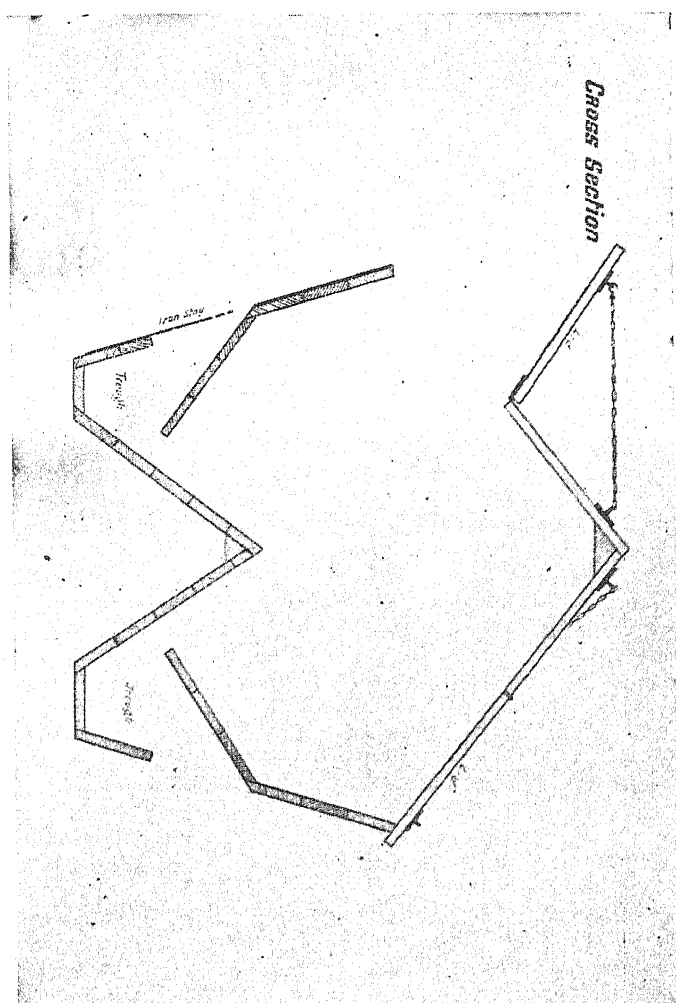
"THE SHEEP HURDLE.—No well-regulated sheep farm is complete in all of its appointments without the hurdle. This portable fence is an indispensable factor in the successful and economical handling of the flock on a small farm, or where the system of mixed husbandry is practised. Many opportunities will be presented during the year where it can be used advantageously in dividing pastures or for confining sheep upon certain portions of a field. It will be found invaluable as a quick method for constructing pens, either large or small, at shearing time, or for docking, tagging or dipping. In the winter season these hurdles are a great convenience for inclosing feeding yards, lots for exercise, and small plats for subdivisions of the flock.

"The details for the winter management of the flock are probably much less important here than in almost any other section of the country. The winters are usually open, and much succulent feed can be found in the pastures and the grain and stubble fields during this season. It is not advisable, however, even when conditions are most favorable, to depend entirely upon the open field for the wintering of the flock. Grave mistakes have frequently been made by farmers in this respect. Sheep at times will appear to the eye to be doing well, while in reality they are rapidly losing flesh. The old adage that 'the eye of the master fatteneth his cattle' is somewhat misleading, and will not apply to the flock. The hand alone can be relied upon to reveal the true condition of the sheep.

"AMOUNT OF MUTTON ONE ACRE WILL PRODUCE.—To illustrate the possibilities within the grasp of the farmer for turning his land to profitable account by the production of winter mutton, the amount of mutton that it is possible to produce from the crops grown upon one acre will now be shown from authentic data.

"Selecting for our ration corn silage, clover hay and oats, and basing our calculations upon an acre producing 6 tons of fodder corn, 2 tons of clover hay, or 33 bushels of oats, the relative portions of an acre for growing each of these feeds will be for the corn 16 per cent., for the hay 31 per cent., and for the oats 53 per cent. This will give an average product per acre of 1,920 pounds of silage, 1,240 pounds of clover hay and 630 pounds of oats. With a daily ration of 3 pounds of corn silage, 2 pounds of clover hay and 1 pound of oats, the produce from an acre will feed one sheep 630 days. The ration given is the maximum amount that a matured sheep, weighing 175 to 200 pounds, will consume. A less quantity will suffice for younger sheep, and better gain for food eaten will be obtained. Accepting as a basis for calculation the average results obtained in experimental sheep feeding by the various stations with rations not altogether dissimilar to the one herein given, it will be found that the increased weights obtained will range from about 9 to 15 pounds for 30 days' feeding. This, then, will give us an average gain of 12 pounds per month. It will be noted that an acre is capable of producing sufficient feed to supply the wants of a fattening sheep 630 days, or 10 sheep 63 days. Allowing a gain of 12 pounds per head for every 30 days, we have, as the result of the feed from 1 acre, a gain of 252 pounds live weight, worth at least 10·08 dollars. This does not represent the full amount of feed that an acre is capable of producing during the whole year, as no account has been taken of the aftermath in the clover, or of the value of the rape, wheat or rye, as a fall and winter pasture, which can be produced in addition to the corn. While this does not represent very large direct returns from the land, it is of interest from the fact that this system of farming in conjunction with wheat growing will put off the day of purchasing artificial fertilisers almost indefinitely.

CROSS SECTION OF FEEDING TROUGH, SHOWING METHOD FOR FILLING, ETC.



"PASTURING WINTER WHEAT.—In the spring of 1899 the Oregon Experiment Station, in an endeavour to ascertain the value of winter wheat for pasture, as well as to note the effects of the pasturing upon the yield, selected a uniform plat of $2\frac{1}{2}$ acres of wheat, which was divided into two equal parts by means of hurdles. Upon one part were turned 11 matured sheep, 9 lambs and 3 calves. These were kept there without any other feed for two weeks, until the wheat was pastured down very closely. During their stay on the wheat the aggregate gain in live weight was 200 pounds, with a commercial value of 8 dollars. The lot not pastured yielded only 1 bushel more wheat than the pastured lot. Thus it will be seen that in western Oregon winter wheat can be turned to good account as a spring sheep pasture. Prime muttons are frequently taken directly from the wheat field to the shambles without grain feeding. A supplementary daily grain ration of $\frac{1}{2}$ pound, however, would be followed with better general results."

(To be continued.)

EXPORTING ORANGES.

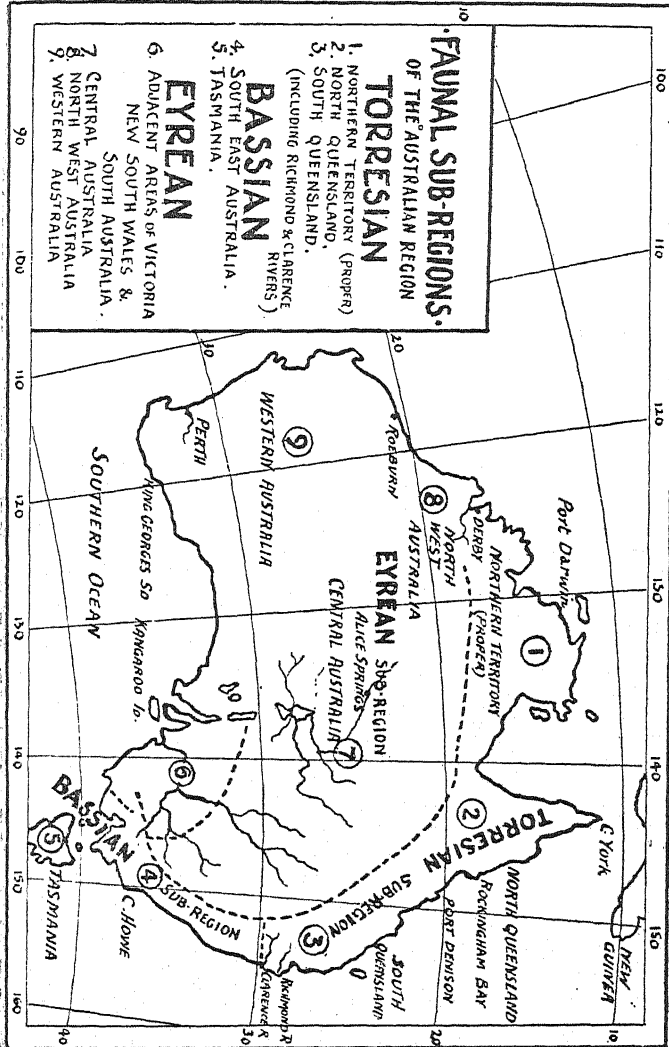
A FAVORABLE SHIPMENT.

The following report submitted by Mr. A. Despeissis, the Viticultural Expert to the Department of Agriculture, will prove of interest, as showing the possibilities in the fruit export trade of this colony:—"On the 13th of July last the department forwarded to the Agent-General in London nine cases of oranges from several orchards around the Swan. The consignment was forwarded as ordinary cargo, and shipped at Albany on the R.M.S. Oruba. As on previous occasions, and in order to better educate the growers themselves regarding sorting and packing for export trade, this care was left to them. As they reached the department, the cases were simply branded, and not opened before being despatched. Thus, the criticisms of the fruit-brokers entrusted by the Agent-General with the care of opening and reporting upon the contents of each case is more likely to bear fruit, and be of value to growers. The practice of repacking the cases at the offices of the department, has since last season, been discontinued, as it was found that although the packages opened in London were in splendid order, little or no benefit was derived by the growers. It is not until they themselves do actually try their hands at packing that they will realise where they failed, and will remedy their defective methods. Messrs. Keeling and Hunt, fruit-brokers, Monument Square, London, thus report on the consignment referred to:—No. 1 case.—Cheriton oranges, Messrs. Harper and Wedge: good, colored fruit, sound condition, slackly packed, and the fruit unwrapped with too much paper. Fruit suitable for this market. No. 2 case.—Do., do.; similar fruits, but of mixed sizes, sound condition, slackly packed, and fruit unwrapped with too much paper. Suitable for this market. No. 3 case.—Washington Navel, Messrs. Harper

and Wedge, Gingen: fine quality, seedless oranges. Fruit in good condition, and splendid colour, but of mixed sizes. This case was received about three-quarters empty, but the inside appearance of the case indicated no waste. The fruit was enwrapped with too much paper. We highly recommend this fruit to this market when properly graded. No. 4 case.—Illawarra Orchard Co., Washington Navel: very large, coarse, and rough-skinned fruit, good condition, case slackly packed and fruit enwrapped in too much paper. This fruit, we fear, is too large to encourage shipment to this country. No. 5 Case.—Do., do., Mediteranean sweet; common, rough oranges, of various sizes, condition good, and fruit of good color. The packing was not so slack as the previous cases, but the quality cannot be recommended, also enwrapped with too much paper. No. 6 case.—Do., do.,; similar fruit, etc., to No. 5. No. 7. case.—Washington Navel, Mr. J. Weidenbach. Mixed description of oranges, viz., seedless and ordinary fruit, mixed sizes, slackly packed, and fruit enwrapped in too much paper. Condition good. This fruit is suitable for this market, when separated according to its class and grade. No. 8 Case.—Blood Oranges, Mr. J. Weidenbach: small size oranges, sound condition, slackly packed, with too much paper. This fruit saleable here, but larger fruit preferred. No. 9 Case.—St. Michael, Mr. J. Weidenbach: rough, ordinary fruit, little waste, too much paper, but the best-packed case. In shipping to this market, too large fruit is not desirable, such as No. 4. All the fruit arrived in good condition, but every case contained mixed sizes, which is important to avoid. All fruit should be graded, enwrapped in white tissue paper, just sufficient to entirely cover the orange, and the case should be fully packed.

SIR GERARD SMITH'S VIEWS.

By the same vessel a case of oranges similar to those referred to in the foregoing report was forwarded to Sir Gerard Smith, late Governor of this colony. Sir Gerard has forwarded the following letter to the secretary for Agriculture:—"36 Cranley Gardens, S.W., August 24, 1900.—Dear Sir,—I am obliged by your letter of the 17th of July. The case of oranges therein named was delivered here yesterday, and on being opened the fruit was found in the finest possible condition, not more than six oranges being damaged. The consignment is apparently of two varieties, viz., the Western Australian Navel and the Siletta. I have tasted both at table. The Navel oranges are superb. Full of flavour, good in colour and texture and syrup. The Siletta variety is good, but the thickness of the skin, the somewhat pallid appearance when cut, and the many pips make me think this sample is very young fruit. Gathered from older trees it would have undoubted merits, and would probably possess more flavour. I am sending a few to a former Secretary of State for the Colonies, and hope to write you again on this matter. With best wishes, yours, etc., GERARD SMITH."



THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

Where agriculture opens the country, there most surely bird-life lessens, unless specially cared for.

This is perhaps no more noticeable in the colony at the present time than in the York district. Such should not be, and for the want of interest and knowledge we lose much that should be our gain.

Useful birds which timidly keep from us would be invaluable were they properly invited to attend us in our field and garden pursuits.

"Economic ornithology," says Dr. T. S. Palmer, "is the study of birds from the standpoint of dollars and cents, and is the practical application of the knowledge of birds to the affairs of our every day life. The study of the relation of birds to agriculture is as intricate and difficult as it is broad and comprehensive. Its successful prosecution presupposes not only an accurate knowledge of classification, distribution, migration and habits, but also an acquaintance with the measures which have been adopted for the preservation of useful or the destruction of noxious species. Theoretically, it should be one of the first branches of ornithology to receive attention; in reality it has been one of the last."

Everyone, more or less, has an acquaintance with animal pests, but only one in fifty people have an idea of the controlling power of birds over noxious animals. It is the smallest of such animals that most largely effect us. The greatest of our birds in size (emu) is known to eat two small bucketsful of grasshoppers daily, in season, while one of the smallest (blue-wren) I have found to eat 80 grubs per day of the highly destructive cockchafer beetle (*anoplognathus*). To terminate the day's eating, one little wren, under domestication, would eat crumbs of meat, and finally, upon a full stomach, conclude with six large blow-flies. This quantity of vermin, varying in its kind, it ate for fifteen months in succession. As for the doings of the birds in size between the emu and wren their power for good is extraordinary, judging by what we know of a few.

If it is thought we can keep all insect life in our gardens in subjection without the aid of the birds beyond them, we are quite in error. It is not a question of birds in our orchards so much as it is the serious one of encouraging them to stay around them. They are the feathered police of the open and the close; and were

it not for them, insect life would gravitate to where it could get most to eat and that in the easiest way. This we know would be to plants under cultivation.

As birds decrease, insects increase. We may spray a few thousand acres, but we could no more do, say the jamwood country, than we could a noble jarrah forest. To allow any great decrease of our birds, as a whole, simply means the compensation of hewing down broad acres of timber to keep in subjection untold myriads of insects.

So wonderfully arranged and dependent upon each other are bird-life, insect-life, and plant-life, that, to disturb the balance of nature to any great extent is inviting personal trouble. Our colony, like others which have their rich areas, teems with destructive insects, but it has its compensating power.

This power in the birds is not in excess of the demand. Take away from their number and a kind of reaction will at once be felt through the medium of insects. In other words the number of birds appear to me to be so delicately adjusted to the number of insects upon which they live, that to decrease the one means to increase the other. To a limited extent we hold an antidote against unstable conditions, but it is very limited as we will observe in this JOURNAL at a later date. With an increase of the acreage of orchards and crops, our knowledge of life-histories increases, and for the first time in the Australian colonies we are making the plant world an economic battler on a large scale against the insect world. I refer to fungus cultures that are grown and sprayed to partly stay the ravages of hungry hordes of caterpillars and grasshoppers.

Even so, there are untold millions of insects that are quite beyond the control of man, and which were never under it.

Here is where birds will serve for centuries the purpose allotted them. Most birds are, more or less, insect eaters, while many are more troublesome to fruitgrowers and agriculturists than directly beneficial.

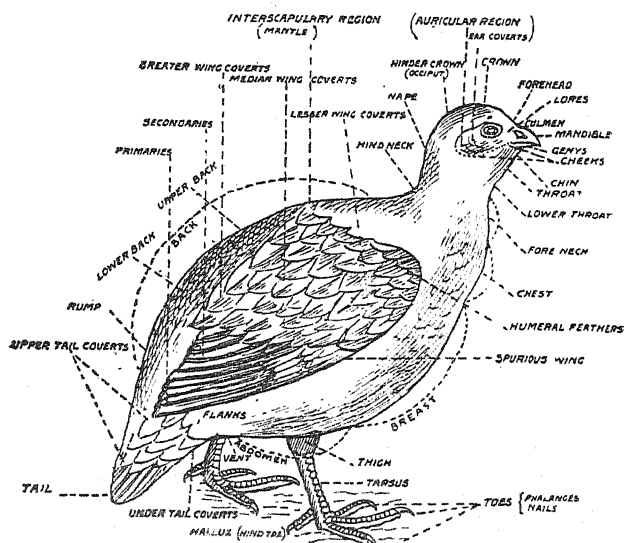
The native birds of our colony from the aspect of the yeoman may be grouped into the sections as under:—

1. Birds exclusively insectivorous or mostly so.
2. Birds insectivorous and vermin destroying.
3. Birds insectivorous and granivorous (beneficial).
4. Birds insectivorous and graminivorous.
5. Birds insectivorous and frugivorous (more or less useful).
6. Birds offensive in certain seasons to fruitgrowers and agriculturists.

For some little time our attention will be drawn to those of the first part, and as many portions of the plumage of a bird are

known by specified names, and as each species is divided into regions, the following figure will serve to explain itself and the letter press in part.

The frequent occurrence of such words as primaries, culmen and lores being necessary, demand it.



In dealing with genera of birds something should always be said of their distribution on the continent. It occasionally happens that the inroad of obnoxious animals may be stayed if we know the highway of their course and from whence they are arriving. Not so much for this reason, perhaps, as for the one in what other parts of Australia our useful birds are found, is the accompanying map shewn. Under each species numerals indicate their positions on the continent and the map is the index to them.

It will be noticed that the insectivorous birds of North-West Australia, as a whole, are very much more closely associated with those of Northern Australia, than with those of Western or South-Western Australia.

As a matter of fact, the position of our birds in the North-Western Australia is practically like one end of a chain that has the other end in Northern Queensland, the connecting link being Northern Australia.

Unlike their wonderful and unique flora the central and South-West portions of our colony have their bird-life in common with Southern and Eastern Australia.

We have many species quite peculiar, but the genera of all our insectivorous birds are common to Western and Eastern Australia.

If we take a strong family of small birds, we will observe that the physical features of a country serve to hold their own species. For example, the diamond-birds are represented along the Fitzroy River by the red-lore species; from Champion Bay to, say, Katanning, then across to Kalgoorlie by the striated species; while all that rich mass of country between Perth and Albany, by the spotted diamond-bird.

These latter two may occasionally venture on each other's territory, but the stronghold of each is as indicated.

Diamond-birds or pardalotes, as they are more correctly termed, are very small, restless birds that travel quickly through the upper foliage of trees.

They are compact in form, with short stout bills, and are undoubtedly among the most beneficial of birds where the opening of a country is concerned. Our colony has five species; just more than half the known forms. Beautifully colored illustrations of most of the birds of this genus may be seen in John Gould's folio work on the birds of this continent. The volumes in the Victoria Library will well repay inspection. I will briefly refer to each species, taking first the—

SPOTTED PARDALOTE (Diamond-bird),

Pardalotus punctatus, Temm. (*Pär-da-lō tus punck-tā tus*.)

Pardalotus, Spotted like the panther; *punctatus*, dotted.

Pardalotus punctatus, Gould, "Birds of Australia," fol., vol. ii., pl. 35. "Key to the Birds of Australia," Hall, p. 46 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 5, 4, 3, 2.

KEY TO THE SPECIES.—Head black, with round white spots; back mottled; loreal spot white; under tail coverts yellow; rump chestnut; mandibles about equal, short and strong; nasal membranes concealed by plumes.

The genus, which is strictly Australian and composed of eight species, ranges in one or other district throughout the continent.

The habitat of this thorough "diamond-bird" is principally in the south-west, while a very close ally, the yellow-rumped pardalote, occupies the adjacent dry country. *P. punctatus* is a creek-loving bird, performing that service along the banks in moist country that *P. xanthopygius* does in the dry and *P. ornatus* in more open and undulating country. This scheme of local distribution is not to apply in any forced way, as birds trespass very

much with a change of season. Both sexes take part in excavating a blind tunnel in the creek bank for their nest, and, like most perching birds, they show a thorough enthusiasm in the work. To find where the species breed is a matter of close observation. It goes to and comes from a hole in the ground that may be owned by any of a dozen other small animals, so undecided are the signs that a bird lives within. Tunnelling for a few inches on an upward grade, and enlarging the end to place a dome-shaped nest in it, is a creditable work for little ordinary birds. Finally, to build in the dark the grass nest that belongs to them is a work of skilful manipulation. Most ground-boring birds are content with the tunnel and a few grass stems. Like everything else, they have their enemies, as I know of a lizard that was drawn out by the tail from the tunnel leading to the nest, only one egg remained and that by timely aid. While ground reptiles devour the eggs and young of this species, the tree building species are worried by tree-lizards. When a number of birds were originally collected that had a spotted appearance, and in most other respects were alike, they were all called *pardalotus* (i.e., spotted), but when a certain *pardalotus* was found that was genuinely and fully spotted it was specifically called *pardalotus punctatus* (i.e., spotted spotted). In Australia this is the only really spotted pardalote, but in Tasmania there is one with forty spots upon it, and actually more spotted.

Nest.—A loosely constructed sphere of grass placed at the end of a short tunnel in the much sloping bank of a creek or hillside near the water. The position varies considerably.

Eggs.—Four in number, and pearly white. Length, 0.75 inch; breadth, 0.55 inch.

ALLIED PARDALOTE (Wit-e-chu),

Pardalotus assimilis, Rams. (*Pär-da-lōtus a-sim-i lis*.)

(Sub-species of *P. ORNATUS*, Temm.)

Pardalotus, spotted like the panther; *assimilis*, like,

Pardalotus affinis, Hall, "Key to the Birds of Australia," p. 46 (1899).

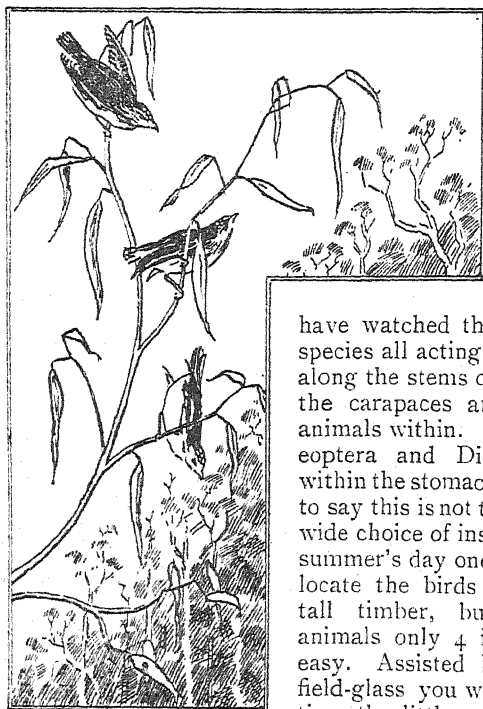
GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 4, 3, 2.

KEY TO THE SPECIES.—Head streaked white; third or third and fourth primaries edged with white; speculum of wing scarlet, crimson, orange, or yellow; bill strong and short, the mandibles about equal; nasal membrane concealed by plumes.

The bird does not stay to winter in its most southern breeding haunt, and is away long before sure signs of the coming fall are noticeable. Quickly bounding in its flight, it shows the usual methods of the diamond-birds. Rushing from bough to bough, and eucalypt to eucalypt, in search of insects, it leads an active

life. The same vigour is shown on leaving its lowly-placed nest, for it flies rapidly up into a tree to view the position, hunt the trail of an insect, then, sooner or later, glide or flutter down to its

previously occupied position, perhaps *en route* to spend a moment on a limb close by. In the search for provender, this useful insectivorous bird follows the course of a bough for "scales," picking up strays and permanents alike. I



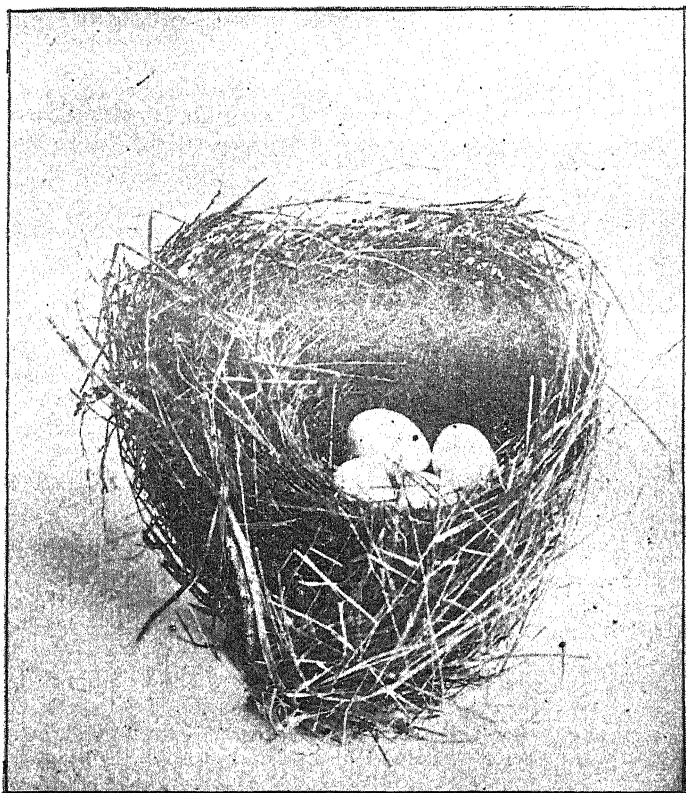
Allied Pardalote.
One-fifth natural size.

I have watched this bird and the other species all acting similarly in travelling along the stems of saplings, taking off the carapaces and feeding upon the animals within. The remains of Coleoptera and Diptera I have found within the stomachs, although I venture to say this is not the staying point in the wide choice of insect life. On a clear summer's day one may try to quickly locate the birds in the high parts of tall timber, but, with slim-bodied animals only 4 inches long, it is not easy. Assisted by their calls and a field-glass you will find them. For a time the little ventriloquists may lead your eyes in all directions, and finally close above you will be seen that for which you search.

Mr. Gould writes of *P. ornatus* having two notes in its call. This phase has three, phonetically "pick-it-up," or "wit-e-chu." Occasionally, I believe, there is a hard-sounding trill, the identity of which I am not sure. Both sexes take part in planning the nest and in the excavation work. While one is labouring at the bowl the other is expelling the material with its feet, little by little, till finally it is forced out beyond the entrance to the ground below. By quietly approaching the tunnel mouth I saw the process in certain of its interesting stages. The male either takes part in incubation, or, which is more unlikely, does all the sitting, because, when I cut away the whole tunnel at a later date (4th November, 1893), I found it alone upon the eggs. Within 2 feet of the entrance was a second cave. It was nearly 3 inches in the hard soil, and sufficient only to shelter the non-sitting bird in the

night. The caliology of the sub-species appears to differ from that of *P. ornatus* in so far as feathers are not used as a lining to the nest. Further observations will probably show there is no regular difference.

Description of nest: As it was described last year for the first time, and being little known, I give more fully a description. Cup-shaped, with an irregular and loosely constructed outer lip, for there are two. Drying grasses are used internally and a soft bark in part, specially upon the floor. The whole appears in two portions, the inner being a neat and cup-like body placed down in a loose but regular spherical wall of dried grasses, interwoven and towering concavely above the lip of the inner wall by an inch on one side and 1.5 inches on the opposite one. Height of nest on one side was 3 inches and 4 inches in the opposing wall.



Nest and Eggs of Allied Pardalote. Two-thirds natural size.
Sample of a nest built in the dark end of a tunnel.

Diameters: Structure, 4.25 inches x 3.75 inches; in bowl, 2.25 inches. Depth of bowl was 1.25 inches. The nest is made to fit in a cavity with domed ceiling in an excavation in the hard subsoil at the end of a tunnel. The tunnel is 10 inches long, and is drilled with a slight upward tendency, as is usual with most ground-boring birds. The nest entrance is 2 feet below the surface of the ground, and in a creek bank some 9 feet above the bed of a trickling stream, though with the stream not immediately below the entrance. By this arrangement the young birds are fearlessly able to essay their first flight. Judging by the remains of old vegetable matter at the base of the nest, the hollow has been used in a previous year for the purpose of nesting.

The nest appears to me as a wonderful piece of architecture when considered it is built in the dark, and not carried whole into the dark cavity.

Nest.—A rounded structure made of grass and bark, open at or near the top. It is placed at the enlarged end of a drill in the bank of a creek, or in the hollow of a tree.

Eggs.—Three to five, white. Length, 0.65 inch; breadth, 0.55 inch.

STRIATED PARDALOTE (Striated Diamond-Bird),

Pardalotus ornatus, Temm. (*Pär-da-lōtus ōr-nātus*).

Pardalotus, spotted like the panther; *ornatus*, ornamented

Pardalotus striatus, Gould, "Birds of Australia," fol. ii., pl. 38. "Key to the Birds of Australia," p. 46 (1899).

GEOGRAPHICAL DISTRIBUTION—Areas 9, 7, 6, 4, 3, 2.

KEY TO THE SPECIES.—Head streaked, white on hinder crown and occiput; al primaries edged with white, forming large wing patch; speculum on wing, red or yellow; strong, short bill, mandibles about equal; nasal membrane concealed by plumes.

In keeping with the other diamond-birds, it is a shade more than four inches in length, and has a lemon yellow throat or chest.

The blotch of color on the wing (speculum) is generally red, but for the first time a specimen has been recorded by the writer with a yellow speculum. This was secured in October, 1899, among the acacias at Katanning, and illustrates a case of what is termed dichromatism. This is the same as saying the one species of bird adopts a certain color in one specimen and another in the second (of the same species). Near Derby a finch (Gould's finch) is even more extraordinary in so far as it is trichromatic. The male bird may have a glossy black head; the female a crimson head, and one offspring a yellow head. In habit this species is very little unlike the allied pardalote, and in conjunction with tits, titmice and certain kingfishers, it is able to live in the driest parts of the inland scrubs. I have had before me for some time certain specimens of

this species that bear on the legs clearly defined, solid and moveable rings of cobweb. I have not been able to learn if other birds are so favored, nor can I so much as suggest a reason why, beyond the one that the spider mites are parasitical upon this bird and for reasons of their own construct these rings, sometimes one on each leg, other occasions one on one leg only. It is one of those interesting points that might be solved by a reader of the JOURNAL should an opportunity occur. Mites (e.g. red spider) are of importance to the economic entomologist and fruitgrower, while Diamond-birds are of interest to the economic ornithologist and fruitgrower.

Nest.—A small hollow in a large tree, or, when opportunity occurs, in a creek bank where it is industriously drilled for 18 inches or even 30 inches by these weak-footed birds. It well forms an object lesson of patience and skill.

Eggs.—Four or five to a sitting; white, rounded. Length, 0.65 inch; breadth, 0.55 inch.

The species that plays an important part in the extreme north is *P. rubricatus*, gold, red, lored pardalote, but until tropical fruits and other acts of cultivation are more developed, it has only an indirect interest to us, economically.

Very much the same applies to *P. uropygialis*, gold, chestnut-rumped pardalote.

There is a further species in the central and southern parts that acts very much like *P. punctatus*. It is rarer, keeps more to dry areas, and some day will be heard more of. It is *P. xanthopygius*, McCoy yellow-rumped pardalote which extends along Southern Australia.

STARTING BEE-KEEPING.

By J. SUTTON, DRAKESBROOK.

Perhaps it may not be out of place to give a reason why Italians are preferred to the common bee. Several very good reasons may be given, but I will only give one or two. First, the Italians are easier to handle, gentle, and quiet, so much so that I have held a frame in my hand while the queen has laid half a dozen eggs. With this particular queen I found it easier to do anything I required without using smoke in any way. Another, and an important item too with Italian bees is, that there is no trouble with the bee-moth, as, while gentle and quiet, they will not allow any foreigner to have a part of their hives, always providing that the hive is so arranged that the bee can get freely around every frame.

Perhaps some would prefer to try their hand at breeding queens for themselves. This I will treat on in a later paper, but

for the present take the advice of a friend, "wait a wee." Having obtained one or two Italian queens, there is yet a lot to learn, and however plain or practical the matter may be placed on paper, it will not avail you until you have made yourself, by actual practice, proficient in handling your pets. They are fussy little bodies, always in a hurry, but do not like others to make any fuss while handling them. Every move must be gentle, quiet, and careful, if the operator does not want to know that his pets have a very pointed objection to clumsiness.

Should any person contemplate taking up the pursuit, it will be to me a real pleasure to give practical instructions at any time, at my apiary, and an hour so spent would probably save many hours hard work, and not a few stings; while I can spend a whole day without any stings whatever.

Perhaps some of my readers may be saying, "it is all very fine telling us how to start bee-keeping, but what about hives?" I will promise, in my next, to deal with this matter of hives. It is one of those questions not yet fully decided, still I will venture (in paper No. 3) to discuss the most suitable hive.

When you find a queen take her up by the wings, place her in your hand carefully so as not to damage her, as very little will end her career. Always remember she is a queen, and should be treated as a queen. There is no need to be afraid, for she is perfectly harmless, and can be handled with impunity, so far as using her sting is concerned.

Taking it for granted that a swarm has been obtained, that they are all working peaceably, that other bee-trees are in the neighbourhood, and that the would be bee-keeper has determined to fell all the trees.

Proceed as before, viz:—Cut down the tree just before sun-down, but instead of fussing with the old brood removed from the tree, take from the swarm already obtained one frame, with brood in all stages. Place this in the centre of the new hive, waiting till the bees have clustered—after having cleared the tree of all comb and honey. Then put in the box two or three frames with full sheets of foundation, and, with a scoop or ladle, lift as many bees as possible, and place them in the hive. Cover up and wait till morning, as before stated, and repeat the operation if needed. This, however, will not often occur. Once the bees settle on the brood comb they invariably go to work and give no further trouble. This may be repeated until all the trees have been disposed of, and in some places a fairly good start may thus be obtained.

Once two or three hives of bush, or black bees, have been obtained, the next best thing is to obtain from some reliable queen breeder, one or two Italian queens, and with these replace the dark queens.

Instructions are always sent with the queen, as to introducing them, but I have found by practical experience, that it is no easy matter for one not used to the general habits of bees to find these black queens. They are, as a rule, exceedingly timid, and the least move causes them to fly and hide. This causes the worker bees to rush and scramble until there is a general commotion right through the hive.

It is best to place the frames having eggs and brood in the centre of the hive, marking them so you will know them on your next visit. Leave them covered for (say an hour or two) then very carefully take out a frame on one side. If your hive is full of frames, lift out of the hive each marked frame, and put in an empty hive, or stand on end in the shade. Then carefully examine each frame until you have found and removed the object of your search. Some times I have spent two or three days before succeeding in finding a dark queen.

I have found the best way to introduce a new queen, when replacing, is to place the old queen in a Miller's cage.

Place the caged queen on top of the frames and leave a few hours, placing the cage so that the bees cannot get to the candy. It is best to do this early in the day. In the evening proceed with your new queen. Remove the cage, kill the old one, and replace with the Italian, leave the cage as before on top of the frames, taking care, however, that the bees have free access to the candy, and by next morning they will have relieved your queen and your work is done.

By replacing a black with a good Italian queen, during a good honey flow, in three months you would not find a single black bee remaining.

PIG-KILLING FOR MARKET.

BY PERCY G. WICKEN.

Numerous complaints as to the condition in which the carcasses of pigs slaughtered for market are often received by the merchants having come to hand, and a visit round the auction-rooms having very emphatically confirmed the same, the few following notes on the subject of killing and dressing pigs for market may prove of interest to farmers:—

A pig that is to be killed should be kept without food for 12 to 18 hours before killing. Before starting to kill the pigs, be sure and get all the tools you require ready to hand, so as not to have to leave your work to look for tools when you start operations. You will require a sharp knife, a pole or nailing hammer, a scraper with a hook at the back, which is for pulling off the hoofs, and is useful for lifting the pig, a block or table to scrape the pig on, a piece of rope with a noose tied on the end, and of course someone to assist you.

When all is ready, catch your pig, and slip the noose round the top jaw behind the tusks, and let the assistant hold it. The pig will then pull back; take the hammer and hit the pig a sharp blow on the head with the blunt end of the hammer, and right in the centre of the forehead a little above the eyes. If struck right he will at once roll over, and by this means much of the noise and screaming usually attendant on pig-killing will be saved. The next thing is to stick and bleed him. Take the top foreleg in the left hand, kneel on the shoulder with the left knee, press the head well back with the heel, so that the throat is thoroughly bare and tight; put the point of the knife in a little behind the gullet, and feel your way gently towards the gullet with the knife until the blood gushes out freely. Then remove your heel and kneel on the pig altogether for a few moments. Every effort should be made to get every drop of blood out of the body. The pig is now ready for scalding, and on whether this is performed properly or not depends the appearance of the carcase when sent to market. The most important part is to have the temperature of the water at the right degree. The water must not be too hot, or you will over-scald your pig; too cold, or the hair will not come freely off. The temperature of the water should be about 165deg. to 180deg. A good way to tell whether the water is at the right temperature is to take a little particle of the clotted blood, and throw it into the water. If the blood immediately assumes a whitish green tinge, the water is too hot; but if the blood, in dissolving, retains its crimson color in the water for about two seconds before it takes the greenish hue, the water is at its best heat, and an excellent scald will be obtained by at once plunging the animal into the water and allowing it to remain there for one to three minutes, according to the condition of the skin. If the blood when cast into water retains its natural color for any length of time, it will be found that the water is not hot enough. A copper of boiling water should be kept close handy so that a few buckets of hot or cold water can be added to the tub as required. A good roomy bath or tub is required, so that the pig can be easily lifted in and out of the water. Where no other means of ascertaining the temperature are available, a mixture of three bucketsful of boiling water and one bucketful of cold makes the temperature about right.

Presuming that the water is at the right temperature, we will now return to our pig. Cut a slit through the nose to make a loop wherewith to lift that end of the carcase. Get a loop with which to lift the pig on the block, which can easily be done by placing the hook of the scraper in the inside of the bottom foreleg and two fingers of the left hand placed through the loop made in the nose. You can now lift the forepart, and let your assistant lift the hind part, and place on the block. It is now ready for scalding. As a hot pig is not an easy thing to lift in and out of hot water, it is best to have a block and tackle to lift it in or out with, or, failing that, to place a couple of strips of canvas under the carcase, which will enable it to be lifted in and out of the water without trouble.

The best plan is to steep the feet first, and when done enough the skin will come off if you rub your hand firmly round the leg. When the legs are clean, pull off the hoofs by means of the hook at the back of the scraper, and then proceed with the side and head, and when you have got one side clean with the scraper, swill it with cold water, and shave off with your knife what hair remains. Turn the pig over and proceed as before. If a proper scraper is not to be obtained, a lid of an old billy or saucepan answers the purpose very well.

When the pig is clean all over, cut the sinews in the hind legs and place a stick between the sinews and bone to keep the legs in position, and then hang up. Cut open as neatly and evenly as possible and take the intestines out; when this is done, wash out with clean water and dry with a clean cloth, and leave until cold and firm. It is now ready for market, and if sent in a clean and wholesome condition, will fetch a much better price than is obtained for many of the carcasses sent in, and is likely to lead to inquiries for more of the same quality. If tied in a clean linen sack before sending away, it will much improve its appearance, and will help to keep it free from flies, dust, etc., and the cost is only a few pence. A good carcase of pork is often spoilt by being sent to market tied up in a dirty chaff bag, which, even if clean, covers the carcase with fluff and spoils the appearance.

STRAWBERRY CULTURE.

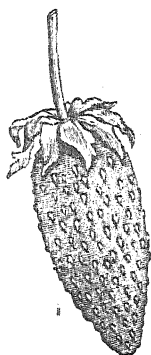
A. DESPEISSIS.

Increased attention is now being directed to the cultivation of strawberries in Western Australia. As few have as yet mastered the art of raising that luscious fruit with full profit and advantage, some notes on this plant, gleaned from the experience won by successful growers both in other parts of Australia, as well as in America and France, will help the local growers to better understand the nature of the strawberry, its partiality to soils and climates, the methods of cultivation most congenial to its growth and production, the best and least wasteful way of handling the crops, and the most efficacious treatment to guard against the pests and blights that prey upon it.

CLASSIFICATION OF THE STRAWBERRY.

The modern cultivated strawberries are derived from four prototypes, two of European and two of American sources. Those improved varieties are, however, widely different from their originators, but they, nevertheless, retain certain characteristics which are essentially their own. By means of hybridisation or pollination, many of the choicest berries have issued, and which combine some of the most prominent features it is sought to develop.

The two European species are : *Fragaria vesca* (so called from the fragrant fruit), the wild Wood strawberry of which the "Queen of Four Seasons" is one of the most prolific and best. Unlike



Queen of Four
Seasons.

those larger fruited strawberries, the result of artificial cultivation, the wild Wood strawberries are easily propagated from seeds, the seedlings bearing as a rule a constant resemblance to the parent plant. This species deserves more attention at the hands of growers, on account of its hardiness and its more protracted bearing season. The berries were originally small, round, and light of color, but by means of careful selection, more elongated, larger, and better colored varieties have resulted, of which the one above referred to is an example. One section of this species is the Bush Alpine or Green Pine (*Fragaria collina*), these are again subdivided into red and white varieties. They produce no runners or creeping stalks, and for that reason are propagated either by division of the plants or from seeds. Their habit of growth makes them suitable for edgings. These species may be planted closer together than the other ones referred to below.

Fragaria elatior of botanists, known as the Hautbois strawberry, a native of central Europe. They are larger, more erect and are of longer appearance than the Alpine, often shy bearers, and amongst other peculiarities, possess a distinct musky flavour. "Belle Bordelaise" is one of this type.

Fragaria Virginiana, the Virginian strawberry, and the parent of the greater number of the improved strawberries in cultivation.

Fragaria Chilensis, the Chilean strawberry, also a native of America, from Oregon to Chili. A large and hardy species with thick leaves, soft and silky underneath. Fruit stalk erect, fruit firm in the flesh and sweet. When first introduced did not find favour, as the blossoms are not self fertile. This defect has been got over by crossing with the Virginian strawberry ex. Ananas or Pine strawberries. Very few are now met with, they having, more or less, crossed with other species.

BOTANICAL STRUCTURE.

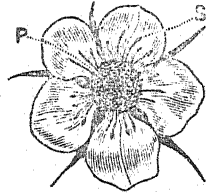
The strawberry is described as a genus of perennial herb, belonging to the general order Rosaceæ. It has trifoliate leaves, creeping stolons or runners, flowers white or yellow. The petals of the flowers are disposed around the more or less enlarged receptacle of the flower stalk. The strawberry is not a fruit in the true sense of the word, but an exaggerated fleshy receptacle of the flower stalk in which are embedded a number of small hard seed-like bodies, which are the true fruits. As the swollen fleshy receptacles grow in size and mature they become colored, juicy and flavoured. In a strictly botanical sense therefore the strawberries are neither berries nor fruit any more than turnips or potatoes are roots.

One striking peculiarity of some strawberry plants lies in the fact that some are incapable of producing fruit without the assistance of some more perfectly conformed individuals, not necessarily of the same species.

There is probably no other branch of horticulture in which sexuality is more strikingly illustrated and means as much from a pecuniary point of view to the grower, than in strawberry growing. Several local growers have stated to me that "although they have heard much about 'pistillate' or non self-fertile strawberries, they did not believe in it, and that all strawberries are fertile." This, however, is not so, and those growers' experience of strawberries was evidently somewhat limited.

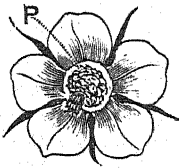
A glance at the two figures representing two different types of blossoms, will show the difference between a perfect "hermaphrodite" or "bi-sexual" blossom, and an imperfect or "pistillate" blossom.

Both possess petals; in the perfect or bi-sexual blossom, and around the convex core which, when developed, constitutes the strawberry are two sets of organs, viz.: the female organs or *pistils* (p) in the centre, and around them the male organs or *stamens* (s). In perfect blossoms, these *stamens* are equal in length, or longer than the *pistils*, and they are then able, when the *anthers* or seed-sacs which surmount each of them, are ready to burst, to shed the grains of pollen on the *stigma* or receptive end of the *pistil*, a tubular organ down which they travel to the ovary, where pollination or impregnation takes place.



Bi-sexual.

The imperfect flowers on the other hand, or "Pistillate," only possess female organ (p), the *stamens* being either absent or diminutive in size, or else reflexed. Such flower, to produce fruit, must be fertilized by a flower possessing *stamens*. It follows in practice that whenever pistillate varieties are planted, it is necessary to intermix with them bi-sexual or hermaphrodite varieties.



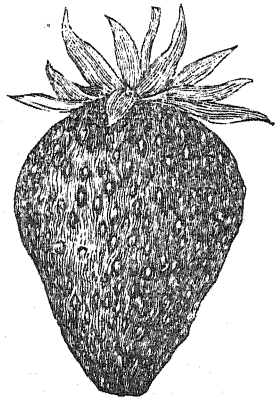
Pistillate.

Such intermarriage must be made with discernment, and it is imperative that the sorts to be mated should blossom concurrently, that is to say, an early and a late blossoming variety, however desirable in every other respect, should not be planted closely adjacent; the period of blossoming of the pollenizer or perfect flowering plant should, moreover, be more protracted than that of the "pistillate," so as to fertilize all the blossoms throughout the blossoming period.

Some growers recommend that the sorts to be mated should ripen about the same time, and be nearly of the same shape and color, so that they can be picked and sent to the market in the same crate, but this is quite secondary to the main consideration, that of being a free pollinator, blossoming at the time required. It is convenient in that case that the sorts brought together, instead of being intermixed haphazard, should be planted in alternate rows. It is generally considered that one row of perfect or bi-sexual strawberries is sufficient to three rows of "pistillate." The pollen in that case is conveyed from blossom to blossom by the agency of wind, insects, and notably bees, which in every well conducted strawberry garden should receive every care and attention.

Although it is recommended that the amateur should do well to entirely avoid pistillates, the commercial grower, on the other hand, will find them as a rule, under proper treatment, more prolific, hardier and better packers than the majority of strawberries: ex Haverland.

Nor are all imperfect strawberries exclusively pistillates; amongst them, and especially in the Hautbois and the Chilian strawberries, male organs only are found on separate plants, as well as female organs on others, and the former are strictly "staminate." Either of the two if left alone would be barren. Occasionally even these species produce perfect flowers, and it is by propagating such plants by runners that self prolific stock have been raised. When the Chilian strawberries were first introduced in Europe, they found little or no favor, all the plants introduced being found to possess female organs only, and it is only after their cultural peculiarities became better known that they were reinstated to the exalted position they now occupy in the estimation of professional growers.



Haverland (P.).

Another peculiarity with regard to some of these varieties is that the male plants are generally more numerous in runners than the female, and grow to vigorous, healthy plants, which tempt the growers; their selection will, however, only lead to so many barren plants being planted.

The conclusion growers should draw from these notes is that although pistillate sorts are highly profitable, they should not be planted alone, but other sorts with perfect flowering organs should be planted as well, amongst them.

SOIL AND LOCATION.

Strawberries adapt themselves to a wide range of soil and location. To reach the top notch of perfection, however, the peculiarities of the several sorts have to be studied and satisfied. Too much sand or too much clay should be avoided. Like the other small fruits the strawberry needs a rich, well-drained and moist soil. In Western Australia the soil which, as yet, has been found best adapted to the cultivation of the greater number of varieties is the soil which, as on the slopes of the Darling Ranges and the undulating country of the lower plain below, supports in its natural state spear wood thickets and red gum with bracken. Such a soil consists of a deep, light loam, warm in color, well drained and generally moist, overlying a stiffer subsoil at a depth of 18 to 24 inches; of the various species of strawberries the wild wood strawberry (*F. vesca*) and the Hautbois (*F. elatior*) do well on light sandy loams. Calcareous soil of a drier nature suits the Bush Alpine, (*F. collina*) a section of *F. vesca*. A rich clayey loam, moist, but well drained, is better suited to *F. virginiana*, and most of the large fruit strawberries. A stiff heavy clay and soil that is liable to become very dry in a short period is unsuitable, and should be avoided, on such soils once the growth of the plants is checked, the crop likewise suffers and is never again a remunerative one.

As a rule, even the same sorts are influenced by variations in the soil and locations. Thus, all things being equal, a strawberry will ripen earlier on a warm sunny slope in light loam, than on heavier and moister flats, where on the other hand, the crop, if later, is generally a heavier one. The practical deduction to be drawn from these facts is that the experienced growers are careful, in order to lengthen the season, to place early sorts on a warm sunny slope, on light loam, and the later sorts on heavy moist flats. Some varieties besides, which show a healthy growth on high, well drained ground and slopes, are badly affected by leaf blight when struck in damp hollow ground, and conversely, by moving some of the choicer and more delicate varieties, too blighted to be profitable, from low, damp ground up to more healthy locations, they speedily become more fruitful and more resistant to blight.

PREPARING THE SOIL.

Although the land need not be virgin land, it is essential that the plot should be new, that is to say, that it should not have been under strawberry culture before, or for many years previously. Strawberries, indeed are gross feeders, and abstract from the ground large quantities of fertilising elements, the depletion of which makes the ground unsuitable for that crop after a period of a few years. Old ground, besides, gets foul with parasitic insects and fungi which prey on the crop. The simplest way of getting rid of such pests is by a system of starvation, which is attained by

refraining to plant strawberry after strawberry on the same ground. The ground should be prepared in the spring and laid fallow for the summer preceding planting. If only a small plot, it can be broken up with the spade or the fork to a depth of 12 to 15 inches. If a larger field, two ploughs, one following in the wake of the other with its mould board taken off, should be made to break up the land to a depth of at least 14 inches.

Several harrowings following this deep ploughing reduce the ground to a state of fine tilth, sweetening it by favoring the atmospheric action upon its mass. This clean cultivation also frees the ground of a great many troublesome weeds and of such destructive underground insects as the wire worms, the white grubs of the cockchafer, and other insects that cause injury to the root system of the plant. Besides, the deeper the ground is worked up the better able it will be to absorb and retain moisture, and the greater mass will there be through which the roots will penetrate in search of food and moisture.

When the time of planting comes—about the end of March—the requisite manure is spread over the ground, which is ploughed again to a depth of 6 to 8 inches, and gathered into lands, narrow if the spot is wet, broader if dry; it is then harrowed, and if still lumpy, lightly rolled down.

MANURING.

The strawberry is a gross feeder, and the more liberal the grower is in feeding it, the more prolific it proves itself to be. The crop is, moreover, a perennial one, that is to say, when establishing a strawberry bed we must store, at the same time, into the ground a stock of fertilisers which will supply all the requirements of the plants for at least three seasons. Nor must the food be stinted to them, but it should be given in plenty and under an easily assimilable form.

These fertilisers should not be buried too deep either, as the strawberry feeds in 15 to 18 inches of soil. After the deep fallowing, but before the light ploughing, which precedes planting out, the manure is placed on the ground.

If well-rotted stable manure is procurable, manure which is not tainted by sawdust litter, and which is procured from stables where the animals are well fed, nothing is better. Thirty loads to the acre is by no means an excessive dressing, and as the composition of that manure varies according to the class of animals kept, their food, and the way it is secured, it is always advisable to supplement its richness by a further dressing of such chemical fertilisers as kainit or muriate of potash, and of superphosphate of lime, in the proportions of 3 cwt. of kainit or 1 cwt. of muriate of potash, and 2 cwt. of superphosphate. The stable manure is evenly scattered first, and the chemical fertilisers broadcasted afterwards, and the land ploughed to a depth of 6 to 7 inches.

The main objection of stable manure, however, is that it generally conveys seeds of troublesome weeds, its haulage is, moreover, costly, and it is not, besides, always possible to get it in sufficient quantity. For these reasons some growers prefer chemical fertilisers at the rate of either, for fairly good land, 5 to 7 cwts. Thomas' phosphate or superphosphate and same quantity of kainit (or one-third the amount of muriate of potash, containing 50 per cent. of potash). For poor hungry land, 8 to 10 cwts. Thomas' phosphate or super and kainit. The mixture is prepared on a floor, or a tarpaulin, by first sifting through a wire screen with $\frac{1}{8}$ in. meshes, and mixing thoroughly with shovels. One half of this amount applied broadcast is used when giving the last working to the land before planting, and the other half sown between the rows during the first season. Just before planting a light dressing of $\frac{1}{2}$ cwt. of sulphate of ammonia or of nitrate of soda is given along the rows, and also early the second spring, just as the plants are moving from their dormant state, another similar application will stimulate a vigorous growth and an abundant setting. Should an abundance of unleached wood ashes be procurable it would form an ideal fertiliser, as it contains both potash and phosphate. A dressing of 60 to 80 bushels to the acre broadcasted, would be a liberal one.

TRANSPLANTING.

After thorough cultivation and manuring, the land should be made smooth by rolling, which also consolidates it.

The time for transplanting having arrived, the plants should be got together. In our climate April will be found a good time. Early in the Spring a small crop may be expected. Strawberry plants will strike at any time provided the ground is moist and warm, but autumn planting is found more profitable. If not planted till the spring, all the fruit buds should be removed as they appear, otherwise the plants become feeble and die. Should a large plot be planted, it is advisable to commence with the early sorts and proceed with the latter varieties.

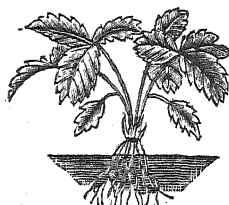
The lines for horse cultivation should be at intervals of 3 ft. or 4 ft., for hand cultivation 2 ft. will be found enough. In either case the distance along the rows should be from 12 in. to 18 in.; this the grower will regulate as he becomes familiar with the habits of growth of the varieties he plants. For horse cultivation the lines must not only be well stretched, but the plants should all be set on the same side of the line, so that as the implements run along the rows the soil is stirred at an even distance from the plants all along the drill.

The following are the number of plants to the acre at the distances mentioned:

2 ft. x 1 ft. ...	21,780	3 ft. x 1 ft. 6 in. ...	9,658
2 ft. x 1 ft. 6 in. ...	14,520	4 ft. x 1 ft. ...	10,900
2 ft. x 2 ft. ...	10,900	4 ft. x 1 ft. 3 in. ...	8,712
3 ft. x 1 ft. ...	14,520	4 ft. x 1 ft. 6 in. ...	7,260

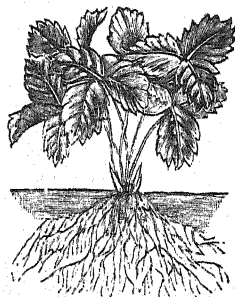
It is often the practice, however, to plant strawberries amongst the trees in young orchards, and in that case ample room should be left between the row nearest to the trees and the trees themselves—4 ft. to 5 ft. at least; this would reduce the number of strawberry plants to the acre very considerably. Growing strawberries in a young orchard, under such conditions is, if the plantation has been well looked after, but beneficial to the trees, as the ground is after two or three years left in a high state of fertility and tilth, which cannot but be conducive to the growth of the trees.

If the beginner has not raised his plants himself, he should procure them from a careful grower, and he should be particularly careful that the parent plants are strong, fruitful, free from leaf blight and other pests; plants affected by disease are dear at a gift. The rooted runners of the previous year's growth having been lifted and bunched up in convenient handfuls, it is important that their roots are not exposed to the desiccating action of the sun and wind. Some place them over the moist earth with a wet bag thrown over them; others after trimming off the dead leaves and young runners and shortening the roots one third, place them in buckets with an inch or so of water, they will then keep for a day or two. A little quantity of lime or wood ashes in the water would kill any possible slugs which might have secreted themselves amongst the roots of the young plants, and when planting a garden free from such pest every care should be taken against its introduction by means of plants, manure or packages.



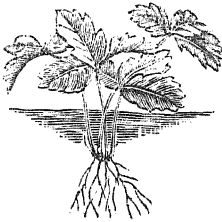
Too Shallow.

The planting is done either by means of special tools or almost as readily by using either a spade or a spading fork, but whatever the method of setting is followed, it is important that the plants be set at the correct depth; that is to say, not too shallow nor too deep, as in the one case they would perish from desiccation, and in the other through suffocation in the earth, the right way of setting the young plants is with the crown level with the ground, the roots spread out, and never stuck in gathered up in a bunch; in any case the earth should be well set and pressed firmly around the roots. Plants of even strength alone should be planted together, or else the fruit crops, which generally sets in the second year after planting, is otherwise uneven.



Correctly Set.

The illustrations from Bulletin No. 32 of the Georgia Experiment Station show clearly how to do, and how not to do the planting.



Too deep.

If the weather be too dry at the time of planting it is better to suspend this work until the ground is in a better condition. Small plots, however, may be planted even then, provided this is done in the evening when the sun is low, and 1 pint or so of water is given to each plant. The next day break the crust to check evaporation, and if the weather continues dry, water two or three times the first week, then once a week until the rain comes.

CULTIVATION.

Careful cultivation, following up careful selection of plants, set into equally carefully prepared soil, is the third element of success of a strawberry plantation. If possible, do not let a single weed go to seed the first season, and the result will be apparent on the crop the following year.

Hoeing should be done whenever a crust forms, a week or two after planting; where horse cultivation is used the hoe should be set shallow—a Planet Junior is excellent for that work—while for a hand hoe, a thin steel tool with both narrow and wide blades, is very convenient—so as not to disturb the young roots. Air and moisture thus freely penetrate the ground, and weeds will be checked. Hand hoeing alone should, however, be used on the ground around the plants. About that time—the second or third hoeing—a slight dressing of sulphate of ammonia or of nitrate of soda, $\frac{1}{4}$ of a cwt. or a little more, is used with advantage along the rows, this dressing will greatly stimulate the growth of the bushes, which will then begin to show their energy by throwing out runners, these should be treated as weeds the first one or two hoeings, so as to get the plant well established before making any new plants. Cultivation should almost cease from blooming time until fruit is harvested. Weeds and grass gain a foothold during that time, the larger weeds are pulled up by the roots, the ground also sets hard under the tread of the pickers and from that cause, as well as from the gradual exhaustion of the soil by continuous cropping and also owing to the spread of pests and parasites, a plot ceases to be very profitable after three or four years. After the season's growth and at the approach of the wet weather in winter, the last working is given to the land; growers in moist localities set their Planet Jr. behind with left and right mould boards, which gather the soil from the plants and make a ridge in the centre, leaving the plants standing in rows of unploughed ground 9 or 10 inches wide. This allows the water to run off and later on, when the ground is worked afresh, these ridges are levelled down by the implements, and the soil is made smooth and mellow.

MULCHING.

Two or three months after autumn's planting, and before blossoming, it is advisable to coat the ground with some sort of mulching two inches thick. Clean straw or grass, rushes, pine needles or some other such like material may be used for the purpose. Stable manure, owing to the ammonia it gives off and which rots the berries, or makes them too soft and tender to travel, is not to be recommended; it also conveys weeds and many insect enemies. Nor is tan from tanneries, which favours the growth of moulds in the ground, desirable material, as these moulds smother and destroy the roots. Mulching, besides answering the purpose of keeping the fruit free of grit and dirt, thereby adding to its marketable value, also chokes weeds, maintains the surface of the ground moist and porous, and adds a large amount of vegetable matter to the soil when ploughed in. In horse cultivation, and where the rows are well apart, it is better to mulch around the plants, leaving the centre of the rows bare, which enables cultivation to proceed whenever required. Any mulch that packs closely will do more harm than good.

PRUNING.

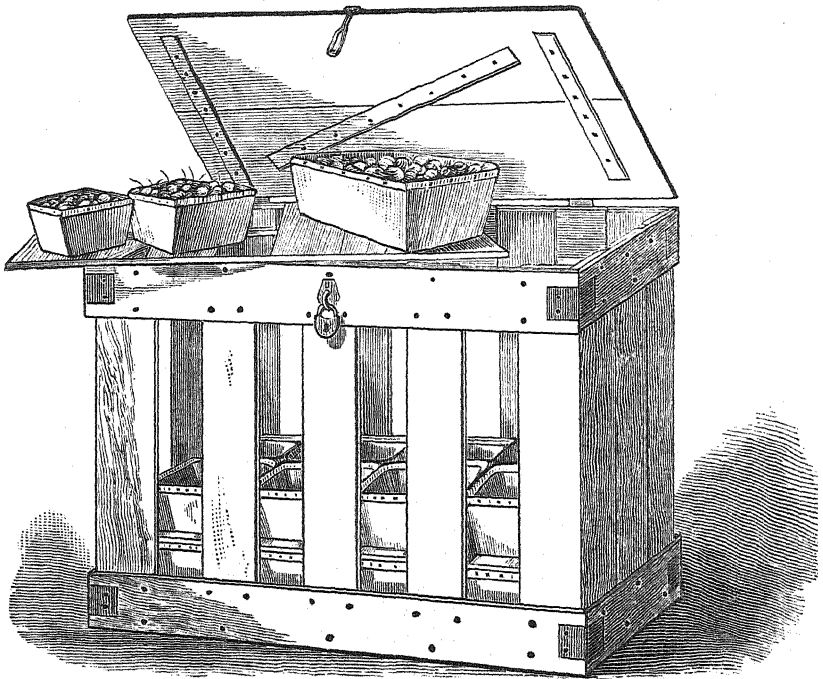
The pruning of strawberry plants is of the simplest. First, when planting, as previously mentioned, all dead and withered leaves are excised and the roots shortened to one-third of their length; then at the time of the first two hoeings all runners are pulled off and all blossoms from autumn-planted strawberries picked until the spring, while it is advisable to pick them all through the first season from strawberries planted in the spring. The necessity of cutting the first runners off is obvious, as, unless this is done, the plants will be weakened and will not bear such a heavy crop of berries. Advantage is thus taken of turning the energies of the plant, always bent on reproducing itself in two directions, from throwing runners and making new plants, into producing fruit-buds in abundance, which eventually will mature into a profitable crop. Once the plantation is well established, runners are only permitted in such cases as are required for propagating purposes.

IRRIGATION AND DRAINAGE.

Although it is admitted by all experienced growers that irrigation lengthens the strawberry season, and that a command of water in a dry spring is of great value and often turns into a bountiful crop one which would, otherwise, have been hopelessly shortened at a critical period of its growth, yet it is also recognised that irrigation presents serious objections.

It is generally costly when undertaken on a large scale; it makes the ground boggy at the time when cultivation and picking should be actively pursued, it causes a considerable amount of

decay of the berries, and given suitable soil and mulching it is absolutely necessary in these localities where strawberry growing is susceptible of being undertaken with profit.



Punnets and Crates for packing soft berries.

Likewise deep underground drainage, with the object of turning unsuitable ground into soil fit for strawberry culture, generally involves growers into an expenditure of time and money which is rarely compensated by an adequate increase of crop; it is better to refrain from growing strawberries on dry, stiff, or on marshy ground, then to try to remedy its natural defects by any method involving any considerable cost.

PROPAGATION.

The Wild or Alpine strawberries and the Hautbois are the only varieties which may, with a fair amount of certainty, be propagated from seeds; all the others, the Virginians, the Chilian and their numerous crosses are always propagated from rooted runners.

Propagation from seeds are also resorted to for raising new varieties or crosses. Well matured, good fruit are for that purpose reduced to the state of pulp in water, and squeezed through a double piece of cheese cloth to separate the seeds, which are then shade dried. These seeds are in the spring sown on a well prepared

bed and slightly covered with garden mould or with sand. When the young plants have grown four or five leaves they are taken up by means of a garden trowel and set again in rows or beds to be permanently replanted later on in the autumn, or they may be left in their nursery beds until required for planting out. These plants will blossom or fruit the subsequent spring, and continue fruiting for several years.

During the fruiting season the same treatment is given to these plants as has been already described, *i.e.*, in the spring and summer they should be watered if necessary, and once or twice during that time all dead leaves should be removed together with such of the runners as are not required for propagation.

Where runners are required the best plants are selected and marked, vigor, earliness (if earliness is of value), productiveness, and general excellence and symmetry of fruit are considered. The flower stalks are nipped off in an early stage, the ground around kept loose with the hoe, and the runners allowed to strike root until the width of the rows is reduced to 20 inches or so, if horse cultivation is used. The runners forming later in the summer should be cut or torn off with the cultivators. To avoid tearing up rooted runners, experienced growers always cultivate in the same direction; if, on the other hand, their object is to prevent them from rooting, they reverse the operation. Judicious thinning out of weak or crowded plants in the row is advisable. There is probably no fruit susceptible of such rapid improvement or deterioration as the strawberry, and for that reason it is imperative to keep on culling plants which do not grow up to a certain standard. Some growers remove altogether the plants selected to a specially prepared bed, thus avoiding the danger of young plants running among and mixing with others. Towards mid-summer the rooted runners are cut off from the parent bushes and made into as many plants as there are rooted joints, and set in well prepared nursery beds from which they are taken up again in the autumn—April—and planted out, when they will begin to bear the following spring.

Runners are produced all the year round, except in winter when the plant should be dormant, but chiefly during the ripening of the fruit; those shooting out are not sufficiently strong for planting out in the autumn and should be weeded out.

An important point to bear in mind by those who intend growing pistillate strawberries is that of intermarriage, and on this question Mr. H. N. Starnes, in a bulletin on strawberries published by the Georgia Experimental Station, makes some pertinent remarks to the effect that: (1) however good a bi-sexual strawberry is it will fail as a pollenizer to any particular pistillate it is desired to mate it unless it be a heavy pollinator; (2.) the varieties must bloom approximately at the same time or within a reasonable limit before or after one another, a variation of two or three days making little difference. Then, early blossoming pistillates should be mated with early-blossoming bi-sexuals or hermaphrodites—

mid-season with mid-season and late with late. (3) The time of ripening of the fruit has little or no connection with the period of blossoming, so the pairing cannot be done by merely selecting what are commonly known as early mid-season and late berries; these terms have reference to the maturity of the fruit, not to contemporaneous blooming. The Stanley, Mt. Vernon, Parker-Earle, Marshall (hermaphrodites) are recommended as pollenators for Sadie, Crescent, Bubock No. 5, Greenville, Haverland (pistillates.)

PICKING AND PACKING.

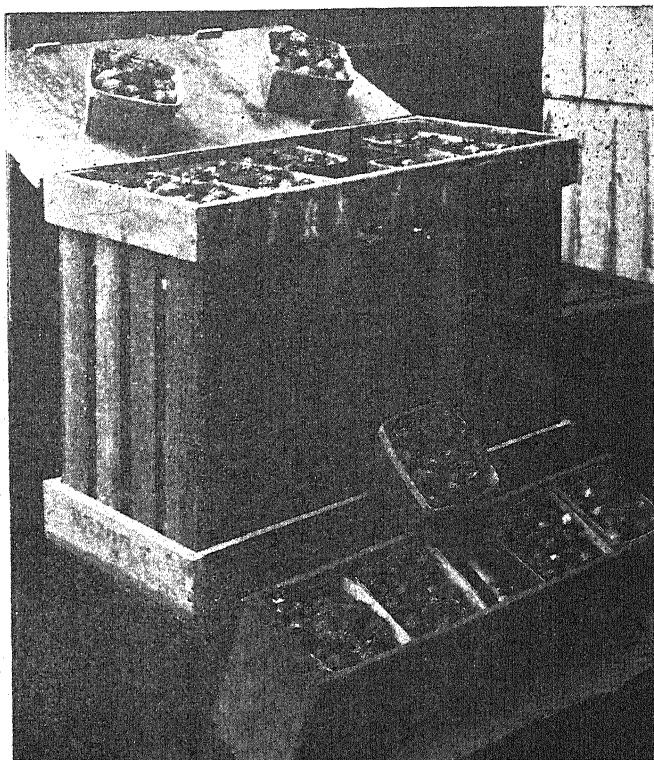
As soon as the berries begin to change color—which will be around Perth about the beginning of September and somewhat later in cooler localities—they should be picked so as to secure the first market. In a week or two and towards the end of September they ripen faster, as the summer heat increases, and such is the productiveness of these small bushes that later in the spring, towards the beginning of November, two pickings a day are necessary. If the grower has had the forethought of selecting suitable sorts which come in succession, this work will go on unremittingly until the end of February or March.

A few cardinal points must be observed in order to obtain full value in the open market. The picking must be done with neatness, thoroughness and honesty. The berries should hardly be touched with the hands but the stalk nipped off between the finger and nail. When dry, all the berries should be gathered at each picking and the sorts should be graded—at first into two grades, and later on when the full season comes all inferior and damaged berries should go to the jam cask.

As the berries are picked they are carefully dropped into small wooden punnets holding either one pint or one quart; these punnets should not be filled too high, and it is permissible to place on top some attractive berries. The packing, however, should be honestly done and all damaged, inferior, or unripe berries excluded from the packages of first-class fruit. At this stage it should be the growers' business to closely supervise the work of the pickers and promptly weed out any showing careless, slovenly habits.

The punnets as well as the crates should not be left exposed to the hot sun or the wind; they are not lined with fancy paper or packing of any sort, although a few leaves will add to the appearance of the fruit. As these punnets are filled they are placed in layers in crates; when one layer is filled a piece of cardboard or some thin boards are placed over it, and another layer of punnets set, and so on until the crate is filled, when the lid is fastened down and the package is ready for conveying to considerable distances, care being taken not to turn the crates upside down. The Sydney and the Melbourne markets are in this way supplied, early in the season, with Queensland strawberries. For long keeping and for distant markets the berries should be picked before they are over-ripe, and of course, the firm-fleshed varieties are for that purpose more suitable than the more tender ones.

The illustration given is of some packages supplied by Messrs. Silbert and Sharp, to the growers they deal with. The larger crate contains five layers of ten punnets, and holds about fifty pounds of strawberries. Alongside of it is a quarter case, turned into use for packing the berries; the centre board has been removed, and thus two rows of five punnets each can be packed into this case. It is essential that the crates be well ventilated; they should also be branded with the grower's name, and such



Punnets and Crates.

brand should be a guarantee of uniformity of contents. On a glutted market, a fair name always receives its own reward. For a local trade, the same packages, if carefully handled, may be used several times. A class of punnets which finds much favor with the public, is called the "gift" punnet; it is supplied with a light movable handle, which, when in the crate, is lowered and lies flat, and is otherwise found very handy by buyers for taking with them from the fruiterers, their box of strawberries.

Towards the middle of the season, when the price begins to decline, and it is no longer profitable to carefully pick and pack all strawberries which do not come up to a certain standard, the time arrives when jam makers get their supply from the gardens. These berries, all sorts and conditions, bruised, over-ripe, small or imperfect, are thrown into kegs provided by the jam makers. Contrary to strawberries intended for the table, these berries which are to be turned into jam, have their fruit stalk and calyx, or "nibs" removed. In that condition they are known to the trade as "pulp," for which the growers receive, in the eastern colonies, from $2\frac{1}{2}$ d. to 4d. per lb., a price which, for that class of strawberries, pays well.

POINTS OF A GOOD STRAWBERRY.

Mr. F. L. Jansen, in a comprehensive paper on the strawberry, published in the *Agricultural Gazette* of the Department of Agriculture, N.S.W., thus summarises the desiderata of a good strawberry:—"The qualities essential to a first-class variety are: fruit large, of a regular, firm, and nearly uniform size, to the end of the season; texture fine, flesh rich and firm, with a moderate amount of acid, and with an aromatic flavour. A longitudinal cut should show no hollow space; the seeds should be deeply embedded, and the calyx set high, so as to be easily detached. The plant should be hardy, vigorous, and strong, with perfect flowers, *i.e.*, self-fertilizing, a prolific bearer, with stalks of sufficient length to keep the fruit out of the dirt."

A FEW PROFITABLE STRAWBERRIES.

The number of varieties of strawberries which, at one time or another, have found favour with growers, is now very considerable. Most of them have some special points of merit which make it more or less desirable under the particular prevailing conditions. It is only, however, by experimentation, by selection, and by observation of what others are doing elsewhere, under conditions somewhat similar to our own, that we are mainly guided in deciding upon what varieties to grow. The strawberries described in this paper have either proved themselves profitable with us, or are highly recommended by successful growers.

WOOD OR ALPINE STRAWBERRIES.

Queen of Four Seasons.—Illustrated above. Very early, fruit oblong, dark red, highly perfumed, and most prolific; one of the best of this class can be propagated from seeds; being a smaller kind, a distance of 18 inches between the rows is sufficient, where horse cultivation is not resorted to. Under high culture, will produce a second crop in the autumn.

HAUTBOIS STRAWBERRIES.

Belle Bordelaise.—Fruit large, roundish oval, dark purple, flesh firm, white, sweet, and musky flavored, ripens mid-season, plants very vigorous and productive, answers to forcing.

Prolific or Musk Hautbois.—Very productive, fruit large, dark purple, flesh firm, sweet, musky flavored, plants strong and productive.

CHILIAN STRAWBERRIES.

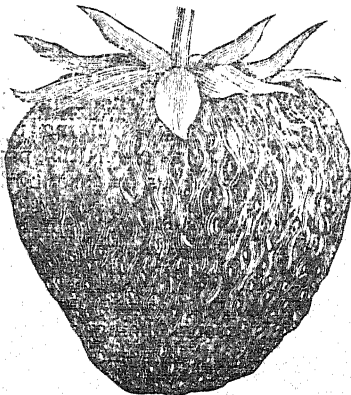
Wilmot's Superb.—One of the few of this class now cultivated. Fruit large, showy, roundish or cockscomb shaped, of a deep pink color, flesh firm, hollow cored, fairly good flavor, ripens mid-season, plants strong, and fair bearers.

White Chilian. Yellow Chilian.—Large, showy, roundish fruit, yellowish-white, with a pink tint on the sunny side, flesh firm, and sweet, packs and carries well, plant hardy, strong, and fairly productive.

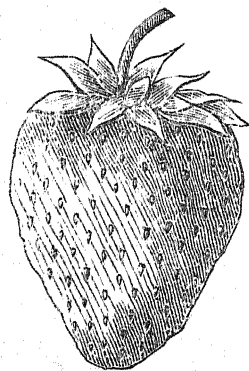
The Chilian and Virginian strawberries have got intermingled to such an extent that there are now but very few pure varieties, and most of those described below, are the result of the cross fertilization of either of these.

Arthur.—A splendid strawberry, a second edition of *Marguerite*, being quite as large, but rather better colored and much firmer. Reported to burn badly in Queensland.

Brandywine (H.).—Plant vigorous; medium sized, dark green leaf; burns somewhat in very dry weather; rather low habit. Berry enormous, conical, regular, deep crimson; ripen evenly; flesh firm; quality good, though somewhat acid. An extremely handsome berry, very productive.



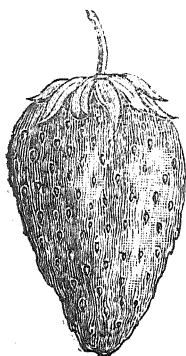
Brandywine.



Captain.

Captain.—Early; fruit large, conical, inclining to cockscomb; color bright red, glossy; flesh firm, good flavor. Carries well.

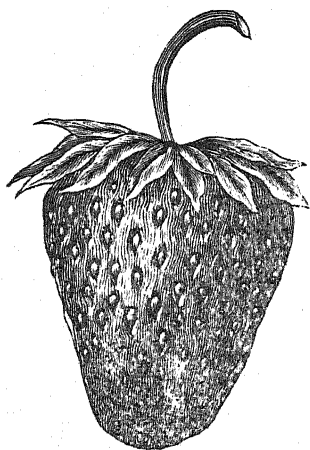
Edith (Edith Christy).—Very early, and one of the most popular strawberries for early market. An Australian seedling. Fruit large, elongated, conical, bright crimson; flesh rather tender, white, tinged with salmon color; pleasant sub-acid flavor. Plant strong, very hardy, and a heavy bearer. Adapts itself readily to a great variety of soils and climate.



Edith.

Haverland (H.P.).—This variety has a few stamens, but is practically pistillate. American origin and, perhaps, more extensively commended than any other variety. Growth not so luxuriant as some others; in Georgia, reported to burn in dry weather. Leaf medium sized, dark green, with long stems but recumbent habit; sets very few runners, hence adapted to hill culture. Berry very large, long, conical, with yellow, sunken seeds, attractive and sells well; quality fair, productive, and an excellent late market berry with *Parker Earle* for a mate. See illustration above.

Hoffman (H).—A Southern States berry, growth vigorous, resists drought well, setting abundant runners; leaf medium in size and color; habit medium. Berry medium, long, conical, deep scarlet, ripens evenly; quality sprightly, but rather acid. Productive early in season, and particularly valuable on the coast, or on sandy land.



Hoffman.

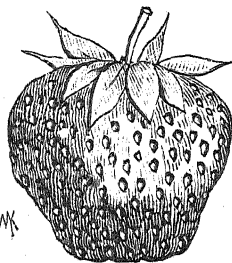
Marguerite.—Very early and popular variety well tested in Australia; fruit large, elongated, conical or cockscomb shape, bright red, shining; flesh white, tinged with pink; core hollow, lacking a high flavor; seeds rather deeply sunk. Plant robust, very prolific and bears for a long time; a better carrier than Edith.

Mt. Vernon (H).—A strong excellent, vigorous grower, with large long stemmed, dark leaves, resisting dry weather to perfection, and setting an abundance of runners. A perfect type so far as growth is concerned. Fruit medium, rounded, and abrupt conical, a beautiful scarlet and evenly colored; quality very good, but berry rather soft. Moderately productive, but an excellent pollinator for late blooming pistillates.

Parker Earle (H.).—A tall, vigorous grower, but burns badly, making, however, a good recovery; sets practically no runners, and hence only adapted to hill culture; leaf medium in size, and green in colour. Berry medium, with distinct neck, long, bright crimson, with a pronounced, rather unpleasant flavor; ripens evenly. Productive and valuable both as a late shipper and pollinator. Requires much moisture to perfect its crop, and does best on heavy soils.

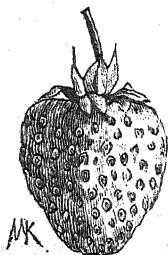
Pink's Prolific (H).—A splendid late strawberry, does very well in Queensland on low, rich scrub land, being quite free from leaf blight.

Sharpless (H).—A vigorous and healthy, but straggling grower, standing drought well and setting a sufficiency of runners; leaf large, rather deep green and fruit very large, irregular and misshapen, many possessing the "cocks-comb" form so characteristic of this variety as to be generally termed the "Sharpless shape." Yet the berries are very handsome, bright scarlet, flesh pink, firm, sweet and good, but with little individuality of flavor; ripens unevenly and inclined to green tips. Fairly productive, will never be discarded as a home berry though not so well adapted to market purposes. Does well in heavy soil.

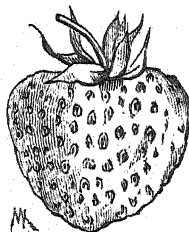


Sharpless.

Sir Joseph Paxton.—Early to medium, excellent, of English origin. Color dark glossy red. Flesh pale red, firm and highly flavored. Plant strong and productive, will not suit every district, but when it will succeed it is useful for all purposes, does well in a light soil—a good carrier.



Sir J. Paxton.
(Two-thirds size.)



Trollope's Victoria.
(Half size.)

Trollope's Victoria.—An excellent English variety, and very popular in Australia. Fruit large, roundish, even outlines; deep bright red. Flesh pale red, tender, juicy. Plants vigorous and prolific; like Edith and Marguerite adapts itself to varied conditions but requires heavy loam to attain perfection, ripens after these two varieties.

PESTS AND BLIGHTS.

Like all highly cultivated plants, the strawberry is affected by parasites of various sorts, of which the most injurious is the

Leaf Blight (*Sphoerella fragariae*), a disease distributed to all parts where strawberries are growing.

Some sorts are less affected than others, and the following have the reputation of resisting the disease better:—Anna Forest, Bidwell, Bubach No. 5, Crescent, Daisy, Hautbois, Haverland, Mexican, Pink's Prolific, Sharpless, Windsor Chief.

The same varieties are affected differently at various stages of their growth, thus: young plants are not so severely affected as older ones, and advantage is taken of this character to renew the crop frequently, that is to say, after two, or at most, three years planting. The leaf blight, when it shows severely before fruiting, directly affects the season's crop, but it generally shows at its worst immediately after fruiting, when the plant is much enfeebled, and the next season's cropping, as a consequence, reduced.

A variety which is severely blighted on low, damp ground, often recuperates when planted on a higher, healthier, and better drained spot. The converse also applies.

The disease is generally distributed through trade and interchange of plants, and it is, therefore, important that growers in localities where the blight is still unknown, should go through even greater trouble in procuring plants from growers where the disease is not prevalent.

The disease is easily recognised by the spots on the leaves, which at first are round, small, purplish in color, and then darker; after a few days the fungus fructifies, and shows on the blotches a grey or white centre. The spots, if numerous, run together, and the leaf withers. The spores which escape from the greyish centre referred to, are carried away by even the gentlest breeze, and on alighting on green strawberry leaves, they germinate, and after penetrating the cells of these leaves, set up fresh spots. The disease kills a leaf in a few weeks.

Whilst it is attacked, the plant makes spasmodic efforts to ripen its fruit. It succeeds in ripening first a few fruit, which, if the plant is severely attacked, are under size, malformed, and look miserable productions; then the plant shows symptoms of a relapse, struggles through the renewed attack of the disease, partially recovers and ripens a few more fruit, and so on, until, in desperation, the grower grubs the plant up and burns it.

The treatment of the leaf blight must be preventive, as a leaf once spotted can never be restored to its former healthy appearance, the fungus having its location within the tissue of the leaves.

Should, in spite of the care which has been exercised in selecting healthy plants only, a few spots show on the young strawberry bushes, the simplest remedy is to cut off such leaves, place them in a bucket, take them out of the field, and burn them carefully.

The following figure illustrates the leaf blight on a strawberry plant; the block is borrowed from the *Agricultural Gazette* of New South Wales.



Leaf Blight (*Sphoerella fragariae*).

A plantation on contaminated ground is sure to result in a costly failure, firstly, because the blight will soon take possession of the beds, and secondly, because, as has been already pointed out, the ground has, to a great extent, been depleted of its store of plant food and becomes strawberry-sick. Old plantations should be carefully lifted up and the plants burned.

Early in the spring, just before blossoming, spray with Bordeaux mixture, leave the plants alone when the flowers open, spray every fortnight during the summer. Three or four sprayings in one season will sufficiently copper-plate the plants against the fungus of the leaf blight. The cost of each spraying in material and labor come up to about 2os. each time.

BORDEAUX MIXTURE.

A formula easy to remember is the following :—

Sulphate of copper	...	...	5 lbs.
Quicklime	...	...	5 lbs.
Molasses	...	...	5 lbs.
Water	...	...	50 gallons.

On the method of combining the ingredients depends the chemical composition and physical structure of the mixture. The sulphate of copper and the lime milk, if diluted in a small quantity of water, settle very quickly, and beside, all the copper sulphate is not taken up by the lime and turned into copper carbonate. If too much bluestone is in the mixture or if it has not all been taken up, it will scorch the leaves and the young fruit. A simple test is to dip a new nail or a clean blade of a knife into the mixture, when after a little while, if too much bluestone is present, the nail or the blade will be coated over with copper, whereas if the mixture contains a sufficiency of lime no discoloration will take place.

To prepare the mixture (*a*) dissolve the sulphate of copper—a good deal of that chemical now in the market has been found to be a spurious article, and wherever doubt exists as regards its purity a sample should be addressed to the Department of Agriculture—in half the amount of water, say 25 gallons, this is best done by placing the bluestone in a coarse sack suspended in the water and moving the sack about, when the sulphate will quickly dissolve. (*b*) Make a whitewash of the lime, and strain to separate the grit and bring the milk of lime to 25 gallons. Mix *a* and *b*. Where the mixture has been well prepared there is scarcely any settling after an hour, while the improperly made mixture will settle much quicker.

After two or three crops, when the fruit has been harvested and whilst the plants are resting, mow the foliage both blighted and sound. If no mulching has been used, scatter some dry straw over the beds, without removing the cut leaves, and after a day or so burn quickly by starting the fire from the weather side. If the ground is not too dry, no ill effect will result, and the plants will spring up with fresh vigor. Where fruit trees occur amongst the strawberry plantation, the blaze might damage them, and in that case another alternative offers. Spray the beds with an acid solution made of sulphuric acid 1 pint, and water 6 gallons. This will burn the strawberry tops thoroughly and will rid the beds of spores of parasitic fungi and of insects almost as thoroughly as fire

would. Should the soil contain a moderate amount of lime no injury will be caused. See that the hands and clothes receive no splashes of this acid solution, and wash the syringe immediately after spraying.

Root Fungus.—A white fungus which spreads over the roots and neck of the plant and throttles it. Where the presence of this fungus in the ground is suspected, plough in a good dressing of lime or kainit or better still of both, before planting the strawberries.

Strawberry Bunch or Nematode Disease.—Dr. N. A. Cobb, in the *Agricultural Gazette* of N.S.W., states that this is a disease first noticed in Kent. It manifests itself by the growth of a large number of small abortive branches or leaves arranged in a more or less dense mass, like the head of a cauliflower or a rose-comb of certain fowls. It is the result of the attack of a number of microscopic nematode worms (*Aphelenchus fragariae*). These worms are armed with a spear or sting in place of a tongue, and with this spear they pierce little holes in the cells of plants and suck out the contents. Such irritation is thus caused to the plant that it begins to grow in an altogether strange manner. Treatment:—Rotation of crops.

Aphis or Green Flies often penetrate to the roots of strawberry plants, more particularly in loose, light soil, and do much mischief by sucking the juices and thus impairing the vitality of the plant. A liberal dressing of wood ashes scattered over the rows, and also sprinkling with tobacco, tea, or infusion of quassia chips (1 lb. to 6 or 8 gallons) will destroy a great many of those insects; also a spray made of Sulphide of Potassium (Liver of Sulphur) $\frac{1}{2}$ oz. in 1 gallon of water. Burning is mentioned in the case of Leaf-blight Disease. Clean fallowing and rotation will rid the land of that pest.

Slugs are also very destructive. Chimney soot, also kainit, quicklime or wood ashes along the rows.

Thrips and Red Spider. Sulphur with powdered sulphur or tobacco infusion, or Sulphide of Potassium Spray.

Strawberry Beetle, illustrated by Mr. C. French in his handbook of the "Destructive Insects of Victoria." These beetles, one of the worst enemies of the strawberry, bore through and along the stems out to the crown, and quickly kill the plants, which fade and wither away. Plough up and burn the plants every three or four years, and re-plant in a clean place.

Another black beetle, destructive to strawberries occurs here, which I hope to soon have identified.

White Grubs, or larvæ of the cockchafer. Living in the ground and eat the roots, causing the plants to perish. Treatment: thorough, clean fallowing before planting, to starve out the grubs, which live in the ground several years before turning into the perfect beetle. Renew the plantation after three or four years.

Should a few bushes here and there be found to fade away, scratch the ground around, in search of these grubs.

Rats and Mice are also, at times, troublesome.

PROFITABLE AGE FOR A STRAWBERRY BED.

Every experienced grower declares that, except in very few circumstances, a strawberry plantation ceases to be profitable after the fourth season. The first year's crop never pays as well as the second and the third, which are the "money crops." After that time, the ground becomes impoverished of the elements of plant-food required by the crops, and also gets so foul with spores of blight, and with parasitic insects, that it entails too great a cost of time and money to continue battling against them.

A fair crop of strawberries would, through the season, amount to 1 ton per acre, and many successful growers have picked as much as $2\frac{1}{2}$ tons per acre of well cultivated, healthy strawberry plantations. If the profits are large, the fact must not be lost sight of that the cost of establishing a strawberry plantation and of marketing the fruit are also enormous. The thorough preparation of the ground, cost of fertilizers, of plants, the planting itself, cultivation, battling against enemies, mulching, picking, packing and marketing a good crop, cost approximately £50 an acre, and when it is reckoned that beside ground specially adapted for the purpose, strawberry culture requires constant, patient, and intelligent attention, no one can begrudge to the grower the profit which at times rewards his efforts and his enterprise.

A MODEL POULTRY FARM.

BY A. CRAWFORD.

The Alphington Poultry Yards, belonging to Mr. A. W. Leane, are situated on the top of a hill about a quarter of a mile from Claremont Railway Station, and are well worthy of an inspection by anyone who takes an interest in pure bred poultry. Here may be seen, not only winners and champions of the Shows in this colony, but also from those of the eastern colonies. The yards are only about half finished yet, it being intended to more than double them in number. The position is a good one, on sandy soil, on the crown of a hill, where they can get an abundance of fresh air, and at the same time are well supplied with shelter, and certainly the appearance of the birds speaks well for their good health and condition. The runs are 24 feet square, and the sides 7 feet high, with scrub and small trees growing in them. Mr. Leane is planting one of them with *Paspalum Dilatatum* grass to see how it will do, and if it will withstand the scratchings of the fowls. If it does well, it will provide good green picking all the summer through.

In order that there may be no excuse for want of fresh water, it is laid on the full length of the fowl yards, and the vessels that contain it are placed in the shade to keep it cool.

The fowl houses are closed on three sides and open on one, the sheltered side, they are made of P. and B. paper, both sides and roof. Mr. Leane's experience is, that for roofing purposes, iron would be much better coated with refrigerating paint.

The fowl roosts are so constructed as to be entirely vermin proof, a bracket has a small tin cup soldered unto it, this cup is closed at the top, but open underneath, the under part turns up all round, and into the cavity so formed, some kerosene or other liquid or vermin-destroying powder is introduced. Before any vermin could reach the roost they would have to pass through the contents of this cup. The idea is a remarkably good one, and is well worthy of the attention of all those who keep poultry.

For still further shade and shelter, passion fruit is being planted all round the one side of the pens, and these will not only be useful for the poultry, but profitable for the owner as well.

That fowls need a plentiful supply of green feed in the summer goes without saying, and to provide that the following green stuff is grown:—Lucerne, mangels, beet, cabbages and lettuce, over 1,000 of the latter were given to the chickens last season. Of all the green crops given, that relished most by the fowls is rape, and for the summer it is excellent, being so succulent and rich in nitrogenous matter.

Grit is an indispensable article of diet, and this is provided by grinding up old crockery, etc., with an "Enterprise"-mill.

The food is varied in character, but the morning meal always consists of soft food, pollard, bran, and chaff, mixed; this is mixed up with a soup made from boiling bones, together with all the kitchen refuse. At mid-day they are again fed, and this is varied, sometimes green feed, and again maize or Algerian oats. The evening meal always consists of wheat.

Bone meal is given three times a week, and so likewise is sliced green bone.

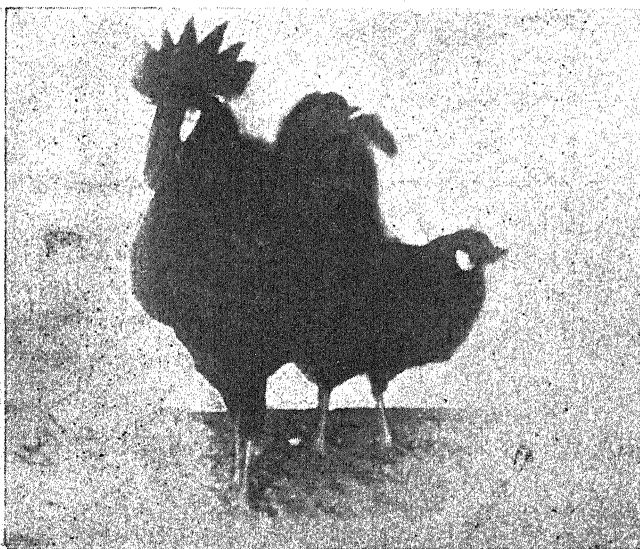
The breeds of poultry kept are White and Brown Leghorns, Minorcas and Andalusians. Pekin and Indian Runner Ducks.

The following particulars as to the number of eggs laid by the respective breeds is interesting, also the average number of eggs required to weigh one pound:—

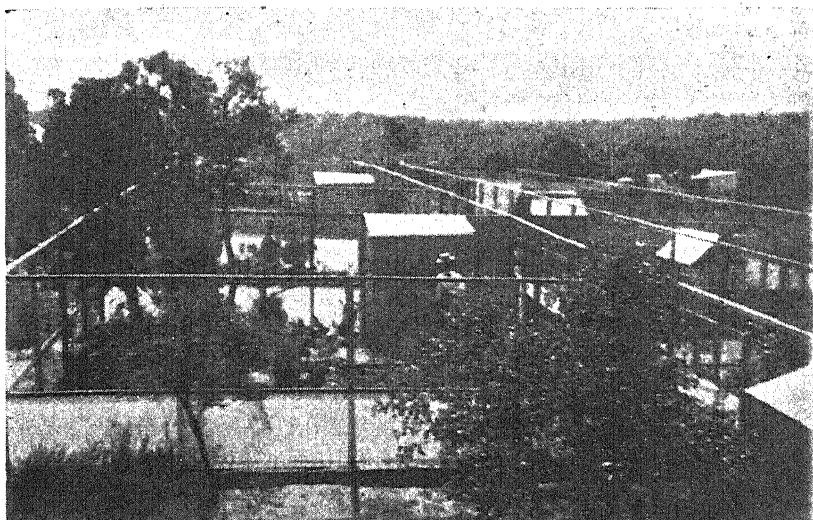
	Average number of eggs.	Number of eggs to 1 pound.
Pekin Ducks	128·7	5
Indian Runner Ducks	195·5	5½
White Leghorns	158·7	6
Brown Leghorns	166·3	6
Andalusians	156	5½



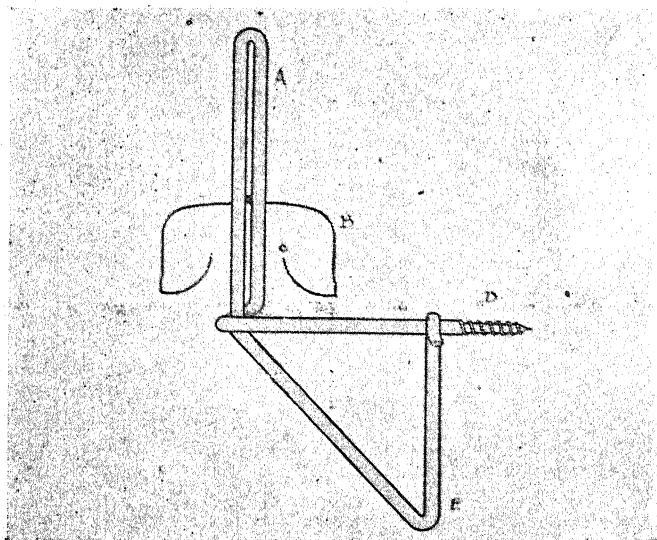
MR. LEANE'S CHAMPION BROWN LEGHORN COCKEREL.



MR. LEANE'S CHAMPION MINORCAS.



ALPHINGTON POULTRY YARDS, CLAREMONT.



VERMIN PROOF BRACKETS FOR POULTRY ROOSTS.

The Indian Runner records are lower than they ought to be, but many were imported, and others have been about from Show to Show all over the colony. Some breeders of Indian Runners have had as high an average as 235 eggs each for 20 ducks. Even taking the above average, it will be seen that they come out a good way ahead of the Pekins, which are the best layers of the other varieties of ducks, and are also well ahead of the Leghorns and Andalusians, which, with the exception of the Hamburgs and Minorcas, are considered the best laying breeds of poultry.

As for the birds themselves, they are the very best of their kind that can be bought, and include winners and champions in each of the various breeds.

A great number of chickens and ducklings are reared each year, and are hatched in the incubator, and reared in foster mothers. By this means they are freer from lice and other vermin than if reared under hens.

The incubator used by Mr. Leane is on a different principle to that in general use in the colony, in having no hot water tank, but the temperature is kept up with heated air. It is an American machine called the Petaluma. It regulates very rapidly; after the opening of the drawer, in a few minutes the temperature will be right again.

In the illustration of the perch bracket, D is a screw that is screwed into the wall, E rests against the wall, and gives stability; C B is the cup for holding kerosene or insectibane, etc.; A is the part that goes through a hole in the perch, which then rests down on the cup.

The Brown Leghorn shown in the illustration, is winner of 5 first and special prizes; the Minorca cockerel 2 first and specials.

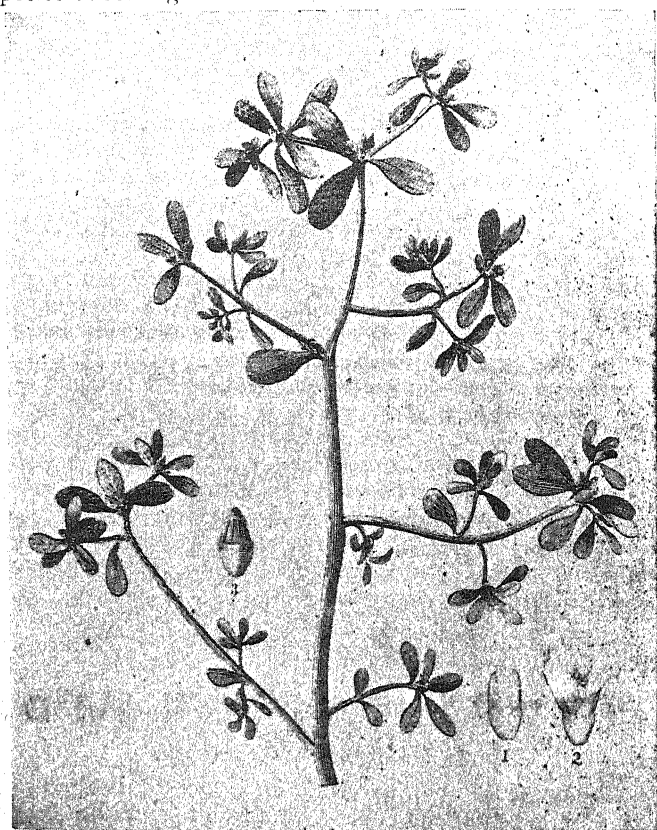
The photograph of the yards give a good idea of the accommodation provided for the fowls.

PURSLANE AS A FORAGE PLANT.

By GOVERNMENT BOTANIST.

Portulaca oleracea, or purslane, is a low prostrate spreading annual with a slender root, succulent, smooth, and of a dull green colour. The leaves are mostly alternate, cuneate-oblong, and usually narrowed into a short stalk. The flowers are solitary, or several together in little heads, and sessile between two or more floral leaves at the ends of the branches. The sepals are two in number, at the base united to one another and to the ovary; there are five petals, scarcely longer than the sepals, slightly united at the base, yellow, and very delicate, melting away after flowering. The stamens are 10 to 12 in number, and with the petals, are attached above the base of the ovary. The capsule is closely sessile, and joined with the calyx in its lower part, opening by the separation of its free portion as a lid; the seeds contain starchy albumen, and are minutely tuberculate.

The plant is found growing spontaneously in all the warmer parts of the world, including all the Australian colonies, but not in Tasmania or New Zealand. The natural order *Portulacææ*, to which it belongs, is a small one, but is well represented in Australia by seven species of *Portulaca*, as well as by a considerable number of species of other genera.



PURSLANE.

Fig. 1, enlarged drawing of the bud. Fig. 2, enlarged drawing of a flower. Fig. 3, seed capsule.

Purslane, though not much in use at the present day, has been known and cultivated in Asia and Europe from the earliest times, being recorded under the name *Andrachne* by Theophrastus and Dioscorides. Historical evidence shows it to have been truly indigenous in the region extending between the western Himalayas and Greece, and southern Russia, but at the present day it is found growing wild in all the warmer countries of the globe. Emigrants from Asia or south-eastern Europe in early times may have taken the plant with them, and thus have begun its dissemination throughout the world, or they may have found the plant already

established in the countries to which they travelled; but as the world is not so young as to have been always dependent on human agency for the distribution of the living things inhabiting it, the latter supposition is just as likely as the former. Purslane is so hardy, and possesses such wonderful vitality, that when torn out of the ground it continues to live and ripen its seeds, which are in due course scattered in the greatest profusion, so that its spread by this means is well assured, while its eradication from land on which it is not wanted is apt to prove a troublesome task.

Portulaca oleracea, like other plants of the order *Portulacæ*, is distinguished by succulency of leaf and shoot, more developed in cultivated varieties than in the wild forms, and on account of this quality purslane has been cultivated in kitchen gardens for use as a pot-herb, salad or pickle. The young shoots are cut off low when a few inches high, after which a fresh growth takes place. Besides their value as an article of diet the leaves and shoots have been esteemed for their medicinal qualities, being cooling and antiscorbutic, as well as nutritious in ordinary use as food, while the herb and its seeds have been credited with a variety of active physiological properties. The herb itself is said to increase the flow of milk in cows, but to cause laxity if too much is given, and the seeds steeped in wine were thought by the ancients to be emmenagogue. In India the fresh leaves are used as a diuretic, and are also when bruised applied externally as a cooling application in inflamed conditions of the skin; while in early times, both the herb and its seeds were administered in a great variety of internal ailments. According to Mr. F. M. Bailey, the aboriginals of western Queensland collect the plants in heaps, turning them over occasionally, and gather the seed as it is shed for use as food. The plant is adapted for growth in a dry climate, and as it provides succulent and nutritious forage during the dry season, while diminishing the necessity for watering stock, it should be encouraged to grow where less hardy plants fail to survive the summer drought. Baron von Mueller suggests its cultivation as a protection against the spread of bush fires; and it might be ploughed in as green manure, especially in cases where its slow decay would keep the soil open for a longer time than other plants similarly used, if that should be desired.

Mention may be made of other plants of the order *Portulacæ* that are used for food of man or beast. Other species of *Portulaca*, besides the purslane, are similarly employed by the inhabitants of the countries in which they are indigenous, and in Australia species of *Calandrinia* or *Claytonia* serve the same purpose. According to Mr. G. J. Brockman one species is much used by the aboriginals as green food, and is greedily eaten by all stock, which require no water during the hottest weather while they have it as food. The same plant is highly ornamental for house decoration; if gathered when in bud and hung up in a room, it opens its pink flowers, independent of soil or water, closing them in the evening, and for

weeks re-opening in the morning when the sun shines. Another small species, also indigenous in the Murchison and Coolgardie districts, and similarly tenacious of life, possesses a thick fleshy root eaten by the aborigines, and likely, from its consistence, to be rather a delicacy. The thick root of *Claytonia tuberosa* is also used as food in Siberia where it is indigenous. The succulent shrub *Portulacaria Afra*, the "speckboom" of South Africa, grows on hot, rocky slopes where grass or other herbage is scarce, and supplies food for elephants there, though none the less useful for sheep or camels.

Besides the possession of nutritive and medicinal qualities for which plants of the Purslane family are esteemed, a number of species are cultivated for the sake of their large and brightly coloured flowers, being at the same time adapted for growth in dry and hot situations in the flower garden.

SCALE OF POINTS FOR JUDGING ORCHARDS.

At the request of the Nelson Agricultural Society the scale of points recently used by that society has been revised by Mr. A. Despeissis, the Viticultural and Horticultural Expert, as follows.

						Old Scale.	New Scale.
Plan	...	...	...	...	...	10	8
Extent	...	...	...	...	...	15	15
Drainage	...	...	...	...	...	—	7
System of planting, laying out distance							
apart, correct method of planting						25	25
Training and pruning	...	...	...	...	...	25	25
Selection of varieties	...	...	...	...	...	10	10
Productiveness	...	...	...	...	...	25	20
Cultivation and freedom from weeds	...	...	...	...	...	50	30
Freedom from insect pests and fungi	...	...	...	...	...	30	30
Grafting, budding, or renovating old or	...	...	...	...	...
inferior trees	...	...	...	...	...	—	10
Manuring and use of fertilizers (Bills to	...	...	...	...	...
be produced)	...	...	...	...	...	—	10
Marketing, picking, sorting, and packing	...	...	...	...	...	20	20
Fences and gates	...	...	...	...	...	15	15
Book-keeping	...	...	...	...	...	10	10
Plant for working	...	...	...	...	...	15	15
						250	250

Commenting on the revised scale Mr. Despeissis says:—"It will be seen that the number of points given for a plan of the orchard has been reduced from 10 to 8. An elaborate plan is not of primary importance, a correct record and graphic outline of the orchard being all that is required.

Drainage is added to the list. This was on the original list I submitted to the Society, but was struck out, as it was considered that in an undulating country, with dry summers, drainage is not required. It would be wise, however, to provide for, and encourage that class of improvement, as there exist many hollows and soaks in which water lodges to the detriment of fruit trees and berry bushes.

Productiveness is reduced from 25 to 20 points, so as to encourage owners of young orchards to compete against those longer established. This percentage is further reduced by the addition of new headings. Cultivation and freedom from weeds has also been reduced. Given a suitable plant for working, a well laid out orchard, well trained trees, and land drained and in good heart, cultivation becomes easy, especially in the summer months when weeds grow less vigorously. Besides, cultivation and freedom from weeds, although of paramount importance, and essential to the productiveness and thriftiness of an orchard, are not more so than 'freedom from insect and fungoid pests.' Quite as large an amount of the season's crop is lost to the grower through the agency of pests as through indifferent cultivation and the presence of weeds, although the grower's mind must be more forcibly struck with the injury done by weeds and bad cultivation, than by that resulting from pests.

Grafting, budding, and renovating old and inferior trees are as important in an orchard as "culling" is among a flock of sheep.

Manuring and the use of fertilizers.—This heading was also, I believe, on the original list submitted a few years ago, its importance is evident."

THE ORRIS-ROOT.

To a speculator, as to a sapper, nothing is sacred; otherwise we might well be astonished to hear that a corner has been established in the orris-root industry—of all others. The British Vice-Consul at Leghorn dwells in his last report upon a crisis which has arisen in this trade in Italy. He tells us that the root, which is used as the basis of many perfumes by the manufacturers of England, France, and Germany, is obtainable only around Florence and in the neighbourhood of Verona. Manufacturers, therefore, have to look to two small districts in one particular country for the whole of their supplies of an almost indispensable article. A syndicate, supported by a powerful bank, has recently secured the entire bulk of the Veronese crop and nine-tenths of that of Florence. A small quantity of Florence root still in the growers' hands is offered at enormous prices. The syndicate itself is holding its stocks, and apparently declines for the present to sell. Representatives of a large perfume manufactory of Grasse recently endeavoured to obtain a small quantity, but without success, and there are now perhaps not fifty tons in the whole of Leghorn. Here is a pretty state of things to come about, while the world has

been too busy with wars and rumors of wars to notice how public interests were being betrayed in the matters of violet powder, sachet perfumes, poudre de riz, and a hundred other delicate wares very useful to children and to the fair sex. No orris-root means none of these and other dainty necessities of the toilet and of the boudoir, or substitutes for them of a more or less fraudulent and unsatisfactory character. Why did we not know before all that this British Vice-Consul tells us too late, that prudent ladies might have stored up good supplies of the vanishing article, and judicious investors enjoyed their little flutter in orris-root? In France they seem to have been better informed. We read in this valuable report that the French manufacturers appear to be fairly well stocked, and are suffering no present inconvenience, although the day will come when they cannot get on without the root, and then they will have to pay heavily for it. Some dealers, however, think that the advance in price is on the whole for the interest of all concerned, as, had prices remained at the level of last year, many large growers would have given up planting. Yet this is difficult to accept in the face of the tremendous profits now and again attaching to the preparation of orris-root. It is a commodity that is subject to the most singular fluctuations in value. A fair average price was fifty pounds per ton. In 1891 as much as one hundred and twenty pounds per ton was paid, and in 1898 as little as twenty-six pounds; now it is going up again by "leaps and bounds," and a holder of orris-root may smile at the woes of Allsops or the vagaries of West Australians. Heaven only knows what price that syndicate may eventually ask and obtain for its stock of root when the French houses have used up all their surplus, and a whole world, bereft of a daily item of comfort and luxury, asks for orris-root, and asks for it in vain. The syndicate has got it all, and unless we shortly discover a new source of supply, or can stimulate to fresh exertions the root-growers of Florence and Verona, they will make perfumers and their customers pay by the nose for the precious article, which must become as dear as whalebone, or ambergris, or attar of roses, if it does not pass out of general sight and use altogether.

What, then, is this orris-root, which suddenly has become or has been made so strangely rare and so terribly costly? The answer is, it proceeds from the rhizomes or underground stems of three different but nearly allied varieties of the iris, styled severally by botanists *Germanica*, *Florentina*, and *Pallida*. The three "flags," for such they are, may be seen planted indiscriminately, and growing together in the damp flats round Florence and Verona, and the peasants call them all by the name of "ghiaggiuolo." You will find them, each and all, mentioned in any good floral catalogue; nay, you may buy, for five shilling and sixpence a dozen—if of a speculative mind—the very iris which furnishes the best orris-root, the *Florentina*, or white flower-de-luce. It has large flowers, pure white, or white faintly tinged with lavender, with a delicate

fragrance between the violet's and the tuberose. The Germanica has blooms which are purple, or violet, or dark blue, or white and yellow, and sometimes, in the Nepalense sort, even striped with red, yellow, and white. The blossoms of the Pallida are of a rosy-lilac hue, and these are the three species which have made their habitual home around the cities of DANTE'S BEATRICE and of SHAKESPEARE'S JULIET, where they sweeten the summer air, flowering from May to the end of June. Yet it is not for their perfume that the shrewd contadini cultivate them; indeed, the Italians are rather insensible to this side of the glory of the garden, and you will hear a Tuscan girl say of the scentless sorts, "E meglio per non puzzare!"—"It is all the better for having no reek." The beautiful plants are fostered for their roots alone. They produce year by year underground shoots or stems—the rhizomes—about three or four inches long, which grow for five years, and then dry and decay. These are taken up, their bark peeled off, and their fibres renewed, after which they are put by to desiccate and ripen. There is no odour about the ugly things in that state, or only an earthy and acrid flavour as of toadstools. But in about two years some subtle inner fermentation transforms the pale, crooked, chalky sticks into the exquisitely-scented fragments which all the world knows, and not the violet in her sweetest moment has finer fragrance than the well-kept orris-root. By distillation the chemist can extract from it the secret of its charm, a crystalline substance called orris-camphor, or oil of orris, which is, however, seldom or never got in an absolutely pure condition, and in such minute quantities that it would take tons of the stuff to furnish a spoonful. Yet the merest touch of it imparts that exquisite aroma of fresh violets which causes it to be so prized by perfumers for dentifrices, face-powders, cosmetics, and the like, and also to enrich essences and oils. For such purposes it has been employed from time immemorial, as one of the weapons of Beauty's armory. The Greek and Roman dames kept it in their toilet-boxes, or carried a nugget of it in their bosoms. CLEOPATRA and RHODOPIS, SAPPHO and HORACE'S LYDIA used and loved it, for it is absurd to think Verona and Florence have any natural monopoly of the article. Probably all and any of the herbaceous and non-bulbous irises which emit fragrance would supply from their rhizomes as good a quality as the Italian cities send. Let somebody of an enterprising turn take to the production of orris-root, and break up an odious monopoly. At the worst he will rear and obtain some lovely flowering plants, for German irises flourish exceedingly in ordinary soil, and thrive about London. Herbaceous irises will nearly all do well in ordinary garden soil, especially when protected from easterly and northerly winds; they delight in well-rotten manure and deep rich earth, and many are very thirsty subjects, and adorn the margins of ponds and streams. At the best, those who can grow and dry the rhizomes will be one hundred pounds sterling a ton in pocket at present prices.—*London Daily Telegraph*, 24th August, 1900.

AGRICULTURAL INVESTIGATIONS IN EUROPE AND ALGERIA.

(From *Worcester Sunday Telegram*, Ohio, U.S.A.)

DATE PALM FOR ARIZONA SAND.

The importation of date palm trees from the Sahara in large quantities by the Department of Agriculture to plant in Arizona was one of the interesting things seen by Dr. N. A. Cobb, who returned yesterday to his home, 30 Maywood Street, Worcester, U.S.A., after a trip of more than three months in Northern Africa and through Western Europe and England.

Dr. Cobb is one of the experts connected with the Department of Agriculture of the colony of New South Wales, Australia, and his interests were largely agricultural, but he collected a mass of information on other subjects as well as matters agricultural.

Since returning to America, Dr. Cobb has received a letter from Prof. Zwingle, saying that part of the palms have been planted in the Salt river valley, near Tuscon, Arizona.

Dr. Cobb said last night the Agricultural Department officials believe, not without reason, that the date palm may be domesticated in the dry regions of this country, a most important thing to accomplish on account of the great value of the tree and the size of the market for dates on this side of the ocean. Prof. Zwingle shipped 20 tons of the trees, said Dr. Cobb. He selected trees of two or three years' growth, and they will begin to bear when six years old, if they thrive in their new home. Date palms need a great deal of moisture when the fruit is ripening, and have to be grown in a river valley or an oasis.

Dr. Cobb went abroad in the interest of his department in Australia. His visit in the desert region was for the purpose of studying the flora of that sort of land with an idea of applying the knowledge thus gained to the agriculture of Australia, where great expanses of arid land are found. There are 40 varieties of vegetation common in the Sahara which are useful as fodder or other purposes. The character, habits and needs of these plants formed his principal study while in Algeria and the French Sahara. Among them is the date palm, which he thinks can be transplanted to Australia with good results. He was struck with the prosperity and success of the great French colony of Algeria, and the neighbouring portions of Africa. He said the French have certainly succeeded in bringing peace and order to that part of the world, and their rule seems beneficial, for they have introduced modern improvements in all things, especially in agriculture, as is natural for so great an agricultural nation as France.

As one result of the progressive French policy startling contrasts may be seen, such as Arabs on the mountains in Southern Algeria ploughing with wooden ploughs, and two miles below in the valley steam traction engines drawing gangs of modern ploughs to turn up the land. The Arab and Algerian elements have to be

handled separately by the French, and the Algerians, though having some degree of self-government, are not allowed to govern the Arabs.

Algeria seems very prosperous. I was told they were making great strides in the making of wine, doubling the product every five years. The country contains magnificent reaches of river valley and rich land among the mountains.

Dr. Cobb said his trip brought home to him more than ever a realization of the greatness of France as an agricultural country. He was given every facility by the officials to study the agricultural colleges and the wonderful crops and methods of French farmers. The international congress of agriculture was in session the three weeks during which he was at or near Paris, and he was invited to attend and take part. He visited the state agricultural school at Grignon, and the famous school of horticulture at Brussels, and made a trip through Normandy and Picardy in the north of France, the greatest agricultural regions of the country. He saw wheat fields as extensive as those of the American western states, and the growth was generally far heavier. Normandy is famous for its cattle and other stock raising, for its wheat and its sugar beet culture. The sugar beet raised in Normandy cannot be surpassed anywhere.

"France is certainly a wonderful agricultural country," said Dr. Cobb. "The single fact that it raises all the wheat consumed within its borders is a demonstration of this. No other nation in Europe, with the exception of Russia can do this, though some wheat is grown in Germany and Austria. Last year France exported wheat. I saw wheat growing so strong and stiff that you could throw your overcoat over it without bearing the stalks to the ground. This on land that has been under constant cultivation hundreds of years, demonstrates the skill of French farmers.

"In England one of the most instructive points I visited was the great government agricultural experiment station at Rothamstead, under the direction of Sir John Laws. They grow wheat there in a manner that cannot be matched in the United States. I saw a crop on land that has grown wheat every year for 57 years, and the crop was double in yield what the average American wheat crop is. They obtain this success by keeping out all enemies of the wheat and not allowing a weed to get a foothold on the land. The farm of the experiment station, which is a big institution, pays, I was told, from the sale of its products, though, of course, it does not pay the salaries of the professors and other experts at the station.

"The French system of instruction in agriculture is perhaps ahead of anything in the world in that line. It is of the most practical and useful character. In this connection I might mention the adoption of co-operation by the agricultural element in France and some other parts of Europe. The French have organized themselves into syndicates, by which the farmers can buy almost everything they want, from a hoe to a gold watch, and the purchases being so numerous, it is a valuable market. Hence the wholesalers are brought into competition for this trade and the

farmers get their goods at lowest possible rates. The application of this to marketing the farmers' product has not been as successful as the other end, though a good deal has been accomplished in this direction also by co-operation. It is astonishing what strides have been made in this matter of co-operation in the agricultural communities of various parts of western Europe.

"Denmark was one of my objective points, to study the dairy industry there. The Danes are the leading dairy people of the world to-day. They are supreme in the English market. Their progress to this excellence has been the wonder of the agricultural world within late years. It has been generally supposed that their success was due to superiority of methods and of implements and machinery. This is an error, for co-operation among the Danish dairymen is the chief factor in their advance. That is the keynote of their rise to the top notch in all matters of the dairy. No agricultural interest has come forward so fast in the last five years as the dairy interest in Denmark."

Dr. Cobb passed some time in Germany, visiting Jena, where he studied at the university 10 years ago; Berlin, Halle, Darmstadt, Bonn, and other places where the great polytechnic and agricultural schools are established.

"No one can take a trip in Germany to-day," said he, "without being impressed with the truth that the Germans are one of the most progressive nations of the world. In this respect they certainly excel the British. One concrete example of this is seen in the way they handle grain. Englishmen are a little slow in adopting the American methods of handling grain, which are the best in the world. They have a few grain elevators, but have no facilities on their railroads to handle grain in bulk. The wheat is brought to the elevator in bags, emptied to store in the elevator, and when an order comes for shipment, the grain must again be put up in bags for transportation by rail. In Germany, on the other hand, it is a common thing to see on the railroads grain cars of the American type. In fact, the Germans know a good thing when they see it, and they go and get it. They have adopted the American freight car as a fast improvement.

"Among the men of my own interest I met during my travels were Prof. Henry, director of the Wisconsin state experiment station; Director Plum of the Indiana station, at Purdue University, and Prof. Frazer, director of the state experiment station of Illinois, all bent on the same general errand as myself. There are, of course, experts in many lines from all parts of the world attending the exposition, and taking the opportunity of studying the institutions of their specialities in Europe."

Dr. Cobb will publish reports of his investigations during the two years and a half he has been away in the *Agricultural Gazette*, a monthly publication of a scientific and practical nature which is furnished by the government to every farmer in New South Wales. He has contributed largely to this publication, which is a model of its class. He intends to go to Australia by way of Europe.

CROPS TO SOW IN NOVEMBER.

PERCY G. WICKEN.

Now that the warm weather is at hand, the difficulties in growing crops and vegetables are likely to increase, unless the grower has the means of irrigating his garden patch. As very few of our growers are able to irrigate, they must do the next best thing they can, and that is to keep the surface soil well stirred and as loose as possible; never allow it to cake. Rake or loosen the surface for a couple or three inches with a hoe, at least once a week, this causes the surface soil to act as a mulch, and keeps the moisture in the lower soil for the roots to take up. Wherever possible use a mulching of stable manure, straw, dry grass, bush leaves and rakings or any suitable substance that can be obtained, as this is a great help to the plants. Work the ground as deeply as possible for all crops you are planting out this month, give all young plants a little water on transplanting, and shelter from the mid-day sun with pieces of bark, etc., until firmly established.

BEANS (French or Kidney). This vegetable does well during the heat of summer, so long as it can obtain sufficient moisture. They should be very plentiful during this month. The pods require to be picked before they become hard, or else the plants soon cease bearing, if constantly picked it is surprising what a quantity can be obtained from a few plants. The younger plants will require to be hilled up, and most likely a little superphosphate and potash manure applied. A few more rows may be sown, and as soon as they appear above ground begin to stir the surface between the rows.

BEANS (Lima and Madagascar). Both these plants will be ready for staking by now. The Madagascar beans can be trained along a fence or side of house, and the Limas should be staked the same as Scarlet Runners, a few more rows of these varieties should be planted out.

BEETS (Red). Those sown last month should now require thinning, thin out to about 1 ft. apart, and keep well hoed between the rows. A few more rows may be sown, soak the seed before planting, and water the ground well after planting.

BEETS (Silver). Those sown last month should now be doing well, it is a very valuable vegetable for the hot weather, the leaves only are used, and only the outside leaves should be pulled, a few at a time, leaving the others to grow, care should be taken to cut the leaves carefully, and not tear them off and injure the plant. A few more rows may be sown in drills about 24 inches apart.

CABBAGE. Plant out a few plants from the seed bed, they require plenty of manure and to be carefully planted out, and plenty of cultivation between the rows. The cabbages aphid is likely to be troublesome to the young plants, especially if the soil is poor and the plants do not make rapid growth. A solution of

Paris Green, say 1 lb. to 250 gallons of water, sprayed over the young plants will be found effective, put on in a fine spray and not sufficient to let it drip off the plants.

CARROTS. Sow a little seed in drills and thin out those that are coming on, and keep weeds down and the soil well stirred.

CELERY. Sow a little seed in a seed pan or box, plant out any plants you may have in richly prepared land either in trenches or on the flat. Celery requires plenty of well-rotted farmyard manure and a good supply of water.

CUCUMBER. A few more hills may be sown, pinch back the shoots of those that are running too far so as to keep them compact.

MELONS (Rock, Water and Preserving). Sow a few more hills of these for late crops, keep those sown well cultivated, and pinch back any shoots that are running too far.

MAIZE (Sweet). This useful and palatable vegetable does not receive the attention it ought to do, if cooked when young it is very nutritious, plant in rows 3 ft. apart, and about 1 ft. apart in the row.

PUMPKINS. A few more hills of these can now be sown, and those growing kept well cultivated. Pineapple, Squash, and some of the early varieties, ought to be ready to pick at the end of the month. Rio or Gramma pumpkins should be planted out this month, they are excellent for pies and preserves.

SWEET POTATOES. Thrive best in a warm sandy soil. They should do well anywhere in our coastal districts, they are easily grown and are very prolific, and are a good wholesome vegetable. Cuttings should be planted out on ridges about 3 ft. apart, and 1 ft. apart in the rows, the cuttings will soon take root, and will grow well during the summer.

TOMATO. Plants that were put in early will now require staking, plant as many plants as you possibly can, they will be useful before the end of the summer.

FARM. If maize, pumpkins, melons, etc., are not all sown, they should be put in at once, and the cultivators must be kept going between the growing crops. Cow peas, soy beans, sorghums, French millets, etc., may all be sown this month. Rio pumpkins also do best if planted at the end of the month. In the cooler districts Circular Head potatoes are said to do well if planted this month, do not cut the tubers too small. The young tobacco plants are now ready to plant out, and will require attention.

In some districts hay making will soon be in full swing, and in others the grain harvest will be getting near, do not forget to look round your reapers and binders, strippers, hay carts, etc., and see that all the parts are complete, and to secure duplicates for parts likely to require attention, also look up your swingle-trees, harness, etc., and have everything ready for the rush of work to come directly harvesting commences, you will have no time to do odd jobs then, and delays may mean serious loss.

MARKET REPORT.

FOR MONTH ENDING NOVEMBER 10TH.

The West Australian General Produce Company report sales effected for the following articles on account of various consignees, for the four weeks ending November 10, 1900:—Business has been fairly active during the past month, and good sales of local produce, (with the exception of one or two lines) bringing satisfactory prices. Bacon—sides of prime quality and light weights selling well. Hams are in fair demand, and there is a prospect of a severe pressure on the supply of the best qualities this season, already we have booked large orders for the Christmas season. Butter—Victorian and South Australian factories have had good sales, prices remaining steady. Local butter is coming in more freely, but unless it is of good quality, is hard to place. Lard, moderate sales, 1 lb. tins having preference to the bladder. Cheese, new season is selling well, New Zealand loafs being preferred. Eggs, local supplies moderate, we wish to impress senders of the necessity of sending their eggs in regular, to insure their freshness, and it will also pay them better, as buyers do not mind paying a higher price if they can depend on them. Potatoes, imported of good quality very scarce. Local potatoes very few offering, and what are coming forward are realising good prices. Onions, the market is very short of anything like a decent sample, a few local coming in, for which there is a good demand. Chaff has been coming in more freely, but the demand for any but prime qualities being slow. Some samples of green sweated chaff have been placed on the market, which is a great mistake, as it has thoroughly disorganised the market. Hay and straw, there has been a moderate demand for manger hay. Bran and pollard, good demand, especially for the latter, the supply being restricted. Flour, local selling well, and we are pleased to report that a sample order has been executed for Colombo, and we fully expect a repeat. Oats, New Zealand good heavy feed sells well. Poultry, a good demand for heavy young roosters fit for the table, also for turkey gobblers and ducks. A great demand exists for pigeons, we have buyers waiting for any quantity. Fruit, the market is bare. We have received our first consignment of Italian lemons in excellent condition, and will continue to receive weekly consignments during the season. Pork, if of good quality and properly butchered, sells well. Sacks and bags, demand in excess of supplies. Oil cake, especially the Sunlight Brand, selling freely. Farm and Dairy produce:—Bacon, sides, case lots, 9d to 9½d, less quantities, 10d to 11d lb; hams, from 1s, 1s 1d, to 1s 2d lb; butter, Victorian and South Australian, 1s 1d to 1s 1½d lb; lard, in 1 lb tin, 9½d; cheese, loaf, case lots, 9d to 9½d lb; eggs, local, 1s 1d to 1s 3d doz; potatoes, imported, £5 15s to £7 ton; potatoes, local, from £9 to £11 ton; onions, 13s to 15s cwt; chaff, from £2 10s to £5 15s ton; hay, £3 to £4 ton; straw, £3 to £3 10s ton; bran, £6 5s to £7 ton; pollard, £6 10s to £7 ton; local flour, sacks, £9 5s to £9 10s; quarters, £9 10s to £9 15s; oats, New Zealand, 3s 2d to 3s 4d bushel; maize, whole, 5s 6d to 7s 6d bushel; wheat, 4s, 4s 3d to 4s 6d bushel; oil cake, £7 ton; Peas, dry, 6s bushel. Fruit.—Oranges, South Australian, 17s 6d to 19s 6d case; lemons, Italian, 35s lemons in case, 25s; lemons, South Australian, 10s, 16s to 19s 6d case; loquats, worth 3d to 4d lb; bananas, 22s 6d to 30s case; Cape gooseberries, 3d to 4d lb; strawberries, worth 1s to 1s 4d lb; extra choice, 1s 6d lb. Vegetables.—Cabbage, 2s 6d to 5s cwt; carrots, 1s 6d doz bunches; parsnips, 2s doz bunches; turnips, Swedes almost unsaleable; beans, broad, 1d to 2d lb; peas, 1d to 3d lb; rhubarb, 1½d to 3d lb; capsicums and chillies, 1s lb. Salads and Herbs.—Lettuce, worth 8d to 1s doz; spring onions, 6d to 8d doz bunches; beetroot, 1s to 1s 6d doz bunches; celery, 1s to 1s 6d doz heads; cress, worth

6d doz bunches; thyme, marjorum, sage, off stalk, 9d lb; mint, off stalk, 6d lb; sweet basil, sweet fennel, off stalk, 1s 6d lb. Poultry.—Good heavy young roosters, 6s 6d to 7s pair; others from 5s 9d to 6s pair; chickens, 3s 6d to 4s pair; ducks, 6s 6d to 7s 6d pair; geese, worth 13s pair; turkeys, gobblers, 25s to 27s pair; hens, 18s to 21s pair. Carcase Meat.—Pork, 40 to 50 lb, 6d to 6½d lb. Sundries.—Bonedust, from £6 10s to £7 ton; phosphate, £4 10s to £5 10s ton; superphosphate, £6 10s to £7 ton; guano phosphatic, £3 15s to £4 10s ton; ammonical, £6 ton; coarse bacon salt, £3 ton; new corn sacks, 7s 6d doz; second hand, 4s 6d doz; new bran bags; 4s 7d doz; second hand, 3s doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING OCTOBER, 1900.

The weather throughout the colony was of a normal type, but a disturbance of a somewhat unusual character passed across the S.W. corner of the Continent on the 26th. On the morning of the 24th there was an anti-cyclone off our S.W. coast, all barometers between Albany and Eucla reading 30·20, with falling gradients of 1·1 inch to Hobart, Tasmania. The barometers in W.A. then commenced to fall rapidly, with easterly winds and sultry, thundery weather. In the extreme S.W. the wind gradually backed to South, but elsewhere they veered to N. and W., showing that the "low" passed overland. It moved very rapidly, and by the morning of the 27th was S.E. of Hobart. Its passage was succeeded by a rapid rise of pressure and the establishment of a pronounced anti-cyclone off our South coast near Albany, with easterly winds throughout South of the latitude of Shark's Bay. At Perth the mean temperature was above that for previous years, the excess for the mean max. being 1·7 and for the mean min. 4·0. For the colony generally the same conditions prevailed, although we are not yet quite in a position to compare this year's figures with averages for previous years. Putting the month's climatological map alongside that for October, 1899, it is seen that similar isotherms of day temperature come much farther South in 1900, and that the cool isotherm of 55° in night temperature is more constricted, indicating that throughout the colony this October was considerably warmer than last. The rainfall was, on the whole, about an average. As usual there was practically nothing North of Shark's Bay; about half an inch fell on the Coolgardie Goldfields and between 2 and 3 inches in the South-West. The total fall at Perth since the beginning of the year is 35·31 or about four inches in excess of previous year's average.

THE CLIMATE OF WESTERN AUSTRALIA.

DURING OCTOBER, 1900.

FROM TELEGRAPHIC REPORTS.

LOCALITY:	Barometer (corrected and reduced to Sea Level).		Temperature.			Rainfall.	
	High- est	Lowest.	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	50.020	29.758	89.8	105.5	74.5	58	1312
Derby .. .. .	.027	.722	85.4	112.2	58.8	nil	1407
Broome .. .. .	.045	.750	81.8	108.2	52.8	nil	1810
Condon .. .. .	.077	.744	79.9	107.8	53.5	nil	1892
Cossack .. .. .	.088	.763	81.6	106.0	61.1	nil	4003
Onslow .. .. .	.122	.886	75.8	102.0	56.6	nil	2696
Carnarvon .. .. .	.213	.883	70.6	98.5	55.1	3	1469
Hamelin Pool .. .. .	.233	.793	70.0	100.6	46.8	7	806
Geraldton .. .. .	.318	.802	66.0	100.0	49.0	31	2070
Hall's Creek .. .. .	.049	.735	85.2	108.0	48.5	nil	1466
Nullagine .. .. .	.060	.674	87.5	105.0	51.0	nil	1550
Peak Hill .. .. .	.103	.725	76.4	97.6	53.6	8	2466
Lake Way							
Cue .. .. .	.215	.700	70.8	97.8	45.4	nil	1941
Yalgoo .. .. .	.218	.702	68.6	98.6	43.8	11	1194
Lawlers .. .. .	.231	.682	72.4	97.7	46.2	2	1397
Laverton .. .. .	.305	.695	71.5	99.4	46.7	6	1480
Meuzies .. .. .	.291	.716	70.4	98.1	45.5	15	1066
Kalgoorlie .. .. .	.321	.728	68.8	97.6	45.2	54	1019
Coolgardie .. .. .	.354	.661	67.6	99.8	45.0	55	955
Southern Cross .. .. .	.287	.743	66.1	97.1	40.0	171	1062
York .. .. .	.299	.738	69.0	92.0	35.8	127	2018
Perth Gardens .. .. .	.291	.671	65.3	90.0	47.2	271	3531
Perth Observatory .. .. .	.292	.702	63.6	88.8	46.1	264	3569
Fremantle .. .. .	.277	.699	63.8	86.6	49.4	199	2693
Rottnest .. .. .	.298	.618	69.7	84.6	52.4	123	2529
Bunbury .. .. .	.317	.681	61.4	85.2	44.2	219	3593
Karridale .. .. .	.316	.725	59.8	84.5	42.2	308	5033
Cape Leeuwin .. .. .	.311	.608	60.7	75.8	59.0	238	4011
Katanning .. .. .	.314	.774	58.8	83.1	37.0	335	2001
Albany .. .. .	.360	.691	58.5	79.0	43.6	364	3636
Breaksea Island .. .. .	.366	.657	58.0	71.0	41.7	244	2626
Esperance Bay .. .. .	.422	.645	60.8	95.0	41.4	165	2614
Balladonia							
Eyre .. .. .	.405	.682	62.9	97.5	37.7	11	1547

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

RAINFALL for Sept., 1900 (completed as far as possible),
and for Oct., 1900 (principally from Telegraphic Reports).

STATIONS.	SEPT.		OCTOBER.		STATIONS.	SEPT.		OCTOBER.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	Nil	..	58	..	Millstream ..	..	..	..	..
6-Mile Hotel ..	..	..	..	..	Hong Kong ..	Nil	..	..	..
Carlton ..	..	..	..	..	Mallina ..	..	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	Nil	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	Nil	..	..	..
Turkey Creek ..	Nil	..	75	4	Balla Balla ..	Nil	..	Nil	..
Ord River ..	Nil	..	..	..	Roebourne ..	Nil	..	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	Nil	..	Nil	..	Fortescue ..	Nil	..	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	Nil	..	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	..	..	..	..
Denison Downs ..	Nil	..	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY:					Chinginarra ..	Nil	..	..	..
Obagama ..	..	..	..	..	Onslow ..	1	1	Nil	..
Derby ..	Nil	..	Nil	..	Peedamullah ..	Nil	..	..	..
Yeeda ..	25	1	..	..	Clifton Downs ..	Nil	..	..	..
Liveringa ..	Nil	..	..	..	Red Hill ..	Nil	..	..	..
Mt. Anderson ..	19	1	..	..	Nanutarra ..	Nil	..	..	..
Leopold Downs ..	Nil	..	..	..	Yanrey ..	45	1	..	..
Fitzroy Crossing ..	Nil	..	24	3	Point Cloates ..	Nil	..	Nil	..
Quanbun ..	Nil	..	..	..	GASCOYNE:				
Nookanbah ..	8	2	..	..	Winning Pool ..	7	1	Nil	..
Broome ..	Nil	..	Nil	..	Towara ..	82	1	..	..
Thangoo ..	..	..	..	..	Ullawarra ..	Nil	..	..	..
La Grange Bay ..	Nil	..	3	1	Woorkadjia ..	Nil	..	..	..
NORTH-WEST:					Winnie Creek ..	Nil	..	..	..
Wallal ..	6	2	Nil	..	Yanyeaeruddy ..	Nil	..	..	..
Condon ..	8	..	Nil	..	Williambury ..	6	1	..	..
DeGrey River ..	Nil	..	..	..	Boolathana ..	..	..	..	..
Port Hedland ..	Nil	..	Nil	..	Carnarvon ..	21	..	3	..
Boodarie ..	Nil	..	..	..	Cooralya ..	..	..	..	..
Yule River ..	..	..	..	..	Doorawarra ..	..	..	..	..
Warralong ..	Nil	..	..	..	Mungarra ..	1	1	..	..
Muccan ..	Nil	..	..	..	Errivilla ..	..	..	..	..
Mulgie ..	Nil	..	..	..	Dirk Hartog Is. ..	Nil	..	..	..
Eel Creek ..	..	..	..	..	Sharks Bay ..	12	1	45	2
Coongon ..	..	..	..	..	Kararang ..	..	..	..	..
Warrawagine ..	..	..	..	..	Meedo ..	..	..	..	..
Bamboo Creek ..	Nil	..	Nil	..	Wooramel ..	Nil	..	20	3
Marble Bar ..	1	1	Nil	..	Hamelin Pool ..	28	2	7	3
Warrawoona ..	Nil	..	Nil	..	Byro ..	2	1	..	..
Corunna Downs ..	Nil	..	..	..	Berringarra ..	..	..	..	..
Nullagine ..	Nil	..	Nil	..	Mt. Gould ..	Nil	..	..	..
Tambourah ..	Nil	..	Nil	..	Peak Hill ..	7	..	8	..
Mulga Downs ..	Nil	..	..	..	Abbotts ..	3	1	6	2
Tambrey ..	Nil	..	..	..	Belele ..	Nil	..	..	..
					Mileura ..	Nil	..	..	..

RAINFALL.—Continued.

STATIONS.	SEPT.		OCTOBER.		STATIONS.	SEPT.		OCTOBER.	
	No. of points. 100 equals 1 in.	No. of wet days.	No. of points. 100 equals 1 in.	No. of wet days.		No. of points. 100 equals 1 in.	No. of wet days.	No. of points. 100 equals 1 in.	No. of wet days.
GASCOYNE--Cont.					SOUTH-WEST DIVISION, CENTRAL (COASTAL):				
Manfred ..	Nil	..	..	..	Gingin ..	460	9	199	11
Mellya ..	8	1	..	..	Belvoir ..	277	9	234	9
Woogarang ..	..	..	..	..	Mundaring Weir ..	368	10	309	13
Wooleane ..	8	1	..	..	Guildford ..	331	9	281	13
Dairy Creek ..	Nil	..	..	..	Canning Timber Mills ..	457	9	372	15
Murgoo ..	15	2	..	..	Kallyamba ..	254	11	..	..
Mt. Wittenoom ..	26	2	..	..	Canning Water-works ..	370	8	345	13
Nannine ..	2	1	Nil	..	Perth Gardens ..	252	11	271	15
Star of the East ..	1	1	Nil	..	„ Observatory ..	230	..	264	14
Annean ..	7	1	..	..	Subiaco ..	228	11	285	14
Tuckanarra ..	Nil	..	Nil	..	Claremont ..	279	10	309	12
Coodardy ..	Nil	..	..	..	„ (Richardson) ..	248	8	..	..
Cue ..	8	2	Nil	..	Fremantle ..	152	10	199	..
Day Dawn ..	5	2	Nil	..	Rottnest ..	191	10	123	..
Lake Austin ..	5	2	Nil	..	Rockingham ..	220	8	223	9
Lemmonville ..	25	3	9	1	Jarrahdale ..	458	9	283	13
Mt. Magnet ..	35	3	7	1	Mandurah ..	408	9	239	14
Challa ..	5	1	Nil	..	Pinjarrah ..	287	7	242	10
Youeragabbie ..	..	..	..	..	Harvey ..	332	8	268	12
Murrum ..	Nil	..	..	..	SOUTH-WEST, CENTRAL PART (INLAND):				
Yalgoo ..	13	3	11	..	Culham ..	223	..	172	12
Gullewa ..	53	6	65	7	Newcastle ..	253	8	174	10
SOUTH-WEST DIVISION (N'N PART):					Eumalga ..	262	8	182	9
Murchison House ..	48	7	..	..	Northam ..	181	8	80	11
Mt. View ..	82	8	34	3	Grass Valley ..	165	7	..	..
Yuin ..	26	4	20	2	Meckering ..	164	6	..	..
Northampton ..	78	4	69	6	Doongin ..	138	8	..	..
Mt. Erin ..	135	6	..	..	Sunset Hill ..	163	6	87	6
Oakabella ..	85	3	..	..	Cobham ..	181	..	139	11
Narra Tarra ..	94	2	..	..	York ..	183	6	127	..
Tibbradden ..	151	7	86	13	Beverley ..	174	10	133	9
Sand Springs ..	187	8	69	10	Barrington ..	167	..	..	..
Mullewa ..	40	2	26	4	Sunning Hill ..	177	7	..	..
Boonal ..	..	..	..	..	Wandering ..	328	8	216	14
Geraldton ..	81	..	31	..	Pingelly ..	160	8	83	8
Greenough ..	151	5	16	4	Marradong ..	278	9	207	9
Dongara ..	117	7	42	10	Bannister ..	327	7	181	8
Dongara (Pearse) ..	112	7	38	6	Narrogin ..	167	11	83	9
Strawberry ..	152	7	66	7	Wickepin ..	162	9	..	..
Mingineew ..	169	8	52	8			8		
Rothsay ..	60	4	12	3	SOUTH-WEST DIVISION (S'N PART):				
Field's Find ..	17	1	10	2	Bunbury ..	380	..	219	..
Carnamah ..	95	9	38	6	Collie ..	..	..	158	15
Watheroo ..	133	6	28	4	Glen Mervyn ..	..	13	209	14
Dandaragan ..	201	7	88	11			10		
Moorra ..	165	8	32	6					
Yatheroo ..	281	8	139	11					
Walebing ..	211	8	42	9					
New Norcia ..	221	8	101	13					

RAINFALL.—Continued.

STATIONS.	SEPT.		OCTOBER.		STATIONS.	SEPT.		OCTOBER.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Dardanup ..	..	..	182	14	—Continued.				
Donny Brook ..	332	11	205	11	Mt. Morgan ..	15	1	5	1
Boyanup ..	341	12	201	13	Laverton ..	22	2	6	1
Busselton ..	312	14	111	16	Murrin Murrin ..	9	2	1	1
Quindalup ..	445	7	157	10	Pendennie ..	26	3	Nil	..
Margaret River ..	556	15	231	9	Tampa ..	5	1	..	..
Lower Blackwood ..	500	9	..	..	Niagara ..	11	1	7	1
Karridale ..	599	17	308	19	Yerilla ..	16	3	7	1
Cape Leeuwin ..	433	18	233	20	Edjudina ..	123	3	..	..
The Warren ..	650	15	..	..	Menzies ..	28	..	15	..
Lake Muir ..	383	18	318	15	Goongarrie ..	22	2	19	2
Mordalup ..	345	15	255	17	Kurawa ..	23	2	42	2
Deeside ..	463	17	213	15	Dixie Mine ..	31	4	50	5
Riverside ..	479	17	..	..	Kurnalpi ..	72	3	39	3
Balbarup ..	435	13	288	14	Bulong ..	53	4	44	4
Wilgerup ..	475	15	191	14	Kanowna ..	38	4	43	2
Mandalup ..	390	10	238	8	Kalgoorlie ..	34	2	54	..
Bridgetown ..	384	14	209	18	Coolgardie ..	77	4	55	..
Greenbushes ..	406	11	223	16	Burbanks ..	84	5	58	5
Williams ..	195	19	170	7	Londonderry ..	83	6	63	5
Arthur ..	190	10	201	11	Woolubar ..	..	..	78	6
Darkan ..	216	9	..	..	Widgiemooltha ..	87	4	53	4
Wagin ..	142	11	146	12	50-Mile Tank ..	126	7	..	..
Glencove ..	150	9	258	10	Norseman ..	176	6	81	8
Dyiliabing ..	148	5	..	..	Bulla Bulling ..	59	3	79	4
Katanning ..	166	11	335	..	Woolgangie ..	100	5	54	6
Kojonup ..	237	8	256	10	Boorabbin ..	45	6	62	8
Broomehill ..	152	8	232	8	Karalee ..	64	5	78	6
Sunnyside ..	169	11	270	14	Yellowdine ..	68	6	55	5
Woodyarrup ..	173	10	295	12	Southern Cross ..	59	5	171	..
Cranbrook ..	230	11	262	13	Mount Jackson ..	56	4	98	4
Blackwattle ..	272	7	..	..	Bodallin ..	..	..	..	..
Mt. Barker ..	333	13	336	14	Kellerberrin ..	162	8	77	7
St. Werburgh's ..	291	12	316	14	Mangowine ..	38	1	38	4
Forest Hill ..	352	15	..	..	EUCLA DIVISION:				
Denmark ..	381	..	331	14	Coconarup ..	173	10	..	..
Albany ..	348	14	364	16	Fanny's Cove ..	389	10	..	..
Point King ..	320	15	313	15	Park Farm ..	330	11	..	..
Breaksea ..	188	17	244	21	Esperance ..	227	..	165	..
Cape Riche ..	220	8	..	..	Gibson's Soak ..	322	9	..	..
Pallinup ..	182	9	309	11	30-Mile Condenser ..	374	6	..	..
Bremer Bay ..	186	10	225	8	Swan Lagoon ..	324	13	..	..
EASTERN DIVISION:					Grass Patch ..	334	11	..	..
Lawlers ..	1	1	2	2	Lynburn ..	..	..	..	..
Diorite King ..	Nil	..	2	1	Israelite Bay ..	168	9	161	7
Sturt Meadows ..	4	1	..	..	Balladonia ..	241	7	174	5
Mt. Leonora ..	8	2	Nil	..	Eyre ..	299	..	11	..
Mt. Malcolm ..	6	1	Nil	..	Eucla ..	230	10	25	2

The Observatory, Perth, Nov. 7 1900.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF
OCTOBER, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of																
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomoloos.	Pines.	All other fruits.	
FREMANTLE	9	17	3236	3236	5	3236	..	838	904	..	1500	65	16	..	18
ALBANY	5	5	257	251	6	251	..	14	89	..	190	1	7
GERARDTON	1	2	15	15	..	..	..	15	..	..	..	..	..	..	..	..	..	..	..	..	..	15	..	..
HAMBLIN .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	15	24	3503	3502	6	..	5	3502	..	847	..	..	..	848	..	1690	65	..	..	1	..	31	..	25

DEPARTMENT OF AGRICULTURE,
5th November, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF OCTOBER, 1900.

NAME OF PORT.	No. of Ships.	No. of Consig- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consig- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consig- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vin Cuttings.	All Other Trees.
FREMANTLE ..	4	4	169	4	169	..	169	7	169	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ALBANY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
RUSSELLTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE
TOTAL ..	4	4	169	4	169	..	169	7	169

DEPARTMENT OF AGRICULTURE,
5th November, 1900.



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NOTES.

NOTICE TO SUBSCRIBERS.—Subscribers are reminded that their subscriptions for 1901 fall due on 1st January. Non-receipt of subscriptions by that date will be regarded as an intimation that the JOURNAL is no longer required, and the names of such subscribers will accordingly be struck off the list.

PRIZE FOR WHEATS.—The Secretary, Department of Agriculture, has received a letter from the Hon. H. W. Venn, M.L.A., President of Royal Commission at the Paris Exhibition, stating that the collection of wheat, to which the Department of Agriculture so largely contributed, has been awarded a Grand Prix.

STRAWBERRIES AT GOOMALLING.—Specimens of Marguerite strawberries have been received by the Department, grown by Mr. F. F. Rose, Hope Farm, Goomalling, this is probably the furthest east that strawberries have ever been grown in this colony. The specimens were rather crushed on arrival, some of them, however, were of good size and well colored.

A NEW VARIETY OF FOWLS.—Mrs. Cookworthy, of the Vasse, has imported six Ancona fowls from England, these fowls for the last two years have been exciting great attention in the United Kingdom, and are considered the best laying breed of fowls of any. They lay remarkably young, Mrs. Cookworthy's pullets having started laying when they were five months old, and have been laying ever since. They are non-sitters. In shape and general appearance they resemble the Leghorn, but in color they resemble the Houdan.

PRESERVING EGGS.—Still another system for preserving eggs for export is to hand. To keep eggs fresh, the *Illustrieste Landwirth Zeitung* suggests the following method:—"Take new laid eggs, as new as possible; free them from all impurity with a damp linen cloth, taking care afterwards to see that they are rubbed thoroughly dry. Then pour a few drops of boiled linseed oil into the palm of the hand, and coat each egg well over therewith, so that the oil gets into every pore of the shell, and lay on a clean shelf, well protected from dust, to dry. On the third day a fine skin will have formed over the egg, which is then in a manner hermetically sealed up and ready to pack away in a cool dry place in the usual way. Care must be taken not to employ either too much or too little oil. In the first case the oil takes long to dry, and when packed away the egg is apt to stick, and so runs in danger of getting broken when being had up for use; in the second case, the egg, of course, is not properly protected, and is sure to become stale. A little practice, however, soon enables anyone to find out the happy medium."

THE BOT FLY.—A simple and effective cure for bots in horses is published by the United States Department of Agriculture. An experimenter tried a few tests upon a quantity of live bots taken from a horse which the bots had killed. When put into sage tea they died in 15 hours; but as that was too slow a process, he tried them in nitric acid; but it seemed to trouble them no more than water. He then bruised some tansy, and made an infusion of the juice and put some of the bots into it. They were dead in a minute. As he had a horse suspected of being troubled with bots, he gave him some tansy tea in the morning, and a dose of salts in the evening. The next morning the horse's excrement contained a pint and a half of the bots, and the cure, after repeated trials, is now said to be recognised as thoroughly effective.

ASHES FOR HORSES.—Writing about horses, the journal of the Jamaica Agricultural Society says:—"Clean wood ashes are better than all the condition powders for the farm horses. In fact, many of the so-called powders are composed chiefly of salt and wood ashes, mixed with probably something else of minor importance. This being the case, I find it much cheaper and easier to administer the wood ashes direct. The ashes can be given to the horses twice a week in their oats at the rate of an even teaspoonful each time. If given carefully and regularly, I believe that no other medicine will have to be given to horses that are fairly treated and cared for. Everyone familiar at all with farm matters must have observed certain habits in many horses and cows to gnaw wooden posts, trees, and similar objects. This craving for something which they do not get from their daily food is satisfied when wood ashes are administered regularly to them. It is just as natural for the animals to desire this as it is for us to have a craving for acids, salt, and even pepper."

PERFUME FARM AND FACTORY AT THE COLLIE.—On November 24th a large party drove out from Bunbury to visit the new perfume farm and factory of Mr. Kirton, on the Collie River. On the arrival of the party, which included most of the Parliamentary representatives and the ladies who visited Bunbury during the agricultural show, Mr. Kirton explained the objects of his industry. He had established this plant, he said, for the purpose of utilising the various shrubs which grew in Western Australia, in order to obtain their essential oils, as he was persuaded that the climate was especially favourable for the growth of the plants and the secretion of the oils. He was at present working on the wild verbena, but intended to deal with lavender on a large scale. He had now several acres of lavender planted, but would not be satisfied until he had planted twenty or thirty acres. Sir John Forrest, in declaring the factory open, drew attention to the value of the essential oils in the eucalyptus, sandalwood, and peppermint, especially dwelling upon the value of the oil extracted from the last-named. After complimenting Mr. Kirton on his enterprise, and

wishing him success, the Premier declared the factory open. In the course of a later conversation, Mr. Kirton pointed out that the price of the oil obtained from the peppermint was only a little more than one-third of that obtained from the eucalyptus globulus, the oil not being considered by the British Pharmacopoeia of much value.

HALTER PULLING IN HORSES.—The halter-pulling habit with horses is easily cured if commenced and followed up in the right manner; but unless the natural laws governing the action of the animal are complied with, it is very difficult to overcome (writes J. C. Curryer in the *Texas Stock and Farm Journal*). You have the horse hitched at the wrong end. Put the rope around his body (in slip noose form), just in front of his hips, with the slip portion under his body when drawn through closely. Pass it along under the body between the front legs, under the nose-band of the halter, through the ring of post or manger, and tie it to the ring of halter, leaving only about 3ft. of space between the head of the horse and the object to which he is hitched. When he pulls back into the slip noose at his rear it will so surprise him that he will immediately spring forward, in accordance with the law that whatever happens back of the centre of the body instinctively forces him forward, which in this case is the desired direction. He should be tied in this manner for some time, or it will do but little good, but if every time he tries it he gets caught in the same way, he will soon stand tied with a mere string.

HEARING AND SIGHT IN HORSES.—The question whether a horse, eye and nose being given equal chances, as on an open plain, would first see or smell a wild foe, has often been discussed, but, for obvious reasons, it cannot be answered definitely, for the simple reason that the two senses are used under different conditions. Given even a gentle breeze, the horse smells an enemy long before he can see it. An Anglo-Indian friend once gave us a curious instance of the different effect upon a horse of the sight and smell of a beast strange to it. He was riding a newly-imported Australian horse across a stretch of park land studded with clumps of bamboo, and when about 500 yards distance discovered that he was riding straight towards a number of elephants, belonging to the Commissariat Department, which, directed by their drivers, were collecting forage. Wishing to test the horse's courage, his rider turned up-wind, and rode within 20 yards or less of the nearest elephant; the horse took no more notice than to prick his ears, and stare. Then he turned back, and making a wide detour, tried to approach the elephants with the wind blowing from them into the horses nostrils. The horse became more and more uneasy, snorting violently, and carrying his head high, with ears pricked stiffly, until he was within about a hundred yards. Then the smell proved too much for him; he swung round, half rearing, and bolted.—*Sydney Mail*.

SHEEP.

BY PERCY G. WICKEN.

Continued from page 317.

LAMB RAISING AND CROSS BREEDING—While dealing with this subject from a farmer's point of view, another matter that requires to be considered is that of raising fat lambs for the local markets. This is a branch of the industry that is much neglected, but, if properly carried out, should prove a highly successful undertaking. The demand for good, fat, young lambs in this market is almost unlimited, the supply nearly nil, and the price obtained is highly remunerative to the farmers. For many years to come there is likely to be a demand much greater than our local growers will be able to supply, and, owing to the decreased number of sheep in the Eastern Colonies and the large contracts in hand for export to Europe, we are not likely to be troubled with excessive importations from that direction. Even at such times as a glut occurs in the market for sheep, the demand for fat lambs raised on a farm and sent direct to market is not much affected, and a ready sale can be looked forward to at all times. The breeding of lambs for market is a branch of the sheep-breeding industry which requires to be studied by itself. The selection of a ram is one of the most important points, he is half, if not three-quarters of the flock. Do not be afraid to invest your money in a good ram. You cannot keep up the quality of the flock unless you use the best sires. A flock of poor quality ewes can be greatly improved in one generation by the use of a good ram, but a poor ram will deteriorate the quality of the best flock. To produce strong, healthy lambs that will mature quickly, the ram requires to be strong and vigorous, so as to be able to transmit his vigor to his progeny.

By using a good Shropshire ram with strong constitutioned merino ewes, some of the best results with lamb breeding have been obtained. In the Riverina district (N.S.W.) this cross has been most successful; and, in fact, in nearly all parts of the colonies the lambs are of excellent quality and sell readily. The Dorset-horn ram is not much used in the colonies, but is largely used in America for raising early lambs. Romney Marsh rams have also been used with success for this purpose. Where the soil is rich and there is plenty of grass the Lincoln, crossed with the Merino, and also the cross-bred ewe, has been very successful.

It is the practice with a number of lamb raisers to buy the Merino ewes that have been culled for age from the large estates, and to put them to Shropshire, Romney, or other rams. These ewes, being brought on to good cultivated lands where there is plenty of food, soon improve, and two, or sometimes three lambs are obtained from them; they are then fattened off and sold to the butcher. This

practice is often carried out with considerable profit, but the following points must be borne in mind: the sheep must have plenty of feed; this is one of the most important points in lamb raising, and to be successful crops must be cultivated and the sheep kept well supplied with plenty of good feed all the time. The lambs should be sold as soon as possible. The ram, as before mentioned, should be as good as can be obtained. The locality and the breed of ram to be used requires careful consideration; much depends on the question of obtaining the breed that is most suitable for the district.

Commenting on the Shropshire Down Cross, Mr. Bruce, the Chief Inspector of Stock (N.S.W.), says:—

For the production of prime fat lambs from Merino ewes there is no better ram, if there be as good, as the Shropshire, and the result is equally favorable where the ram is put to cross-bred ewes. In fact it is hard to say which of these two sets of lambs show the better returns, for while the quality of the Merino and Shropshire lambs may be rather better than the others, they, again, would have the advantage in weight and early maturity, the quality in both cases being excellent.

Referring to the Lincoln and Merino cross Mr. Bruce says:—

If the land is good and well watered and the pasture rich, or where the pasture is fairly good and the owner can supplement it with cultivated food, he might begin by putting well-bred Lincoln rams, with good frames and fleeces, to his Merino ewes. Acting in this way his young sheep would clip fleeces of first-class wool heavier by 1½ lb. than any other cross-bred; and they would, at 18 or 20 months, if well cared for, give a dressed carcase of 60 lb. to 63 lb. of good saleable mutton, though not, perhaps, of the same high quality as that of the Shropshire cross. Then, again, by using the Lincoln ram for the first cross the ewe portion of the "drop" would, through being comparatively large and roomy, make excellent mothers for the next cross, which should, I think, be got by putting Shropshire rams to these Lincoln cross ewes, and the result would be first-class cross-breds for export, which the owner could dispose of either as lambs or as fat sheep, according as he considered best, while the ewe, so long as she was breeding, would give a good return in wool. If, again, the land is not of the best description or the grass not very fattening, or if a sufficient supply of cultivated food cannot be obtained for the sheep, then the owner, instead of using Lincoln rams for his Merino ewes, could try the Shropshire or English Leicester, or even the Border Leicester, taking them, as to preference, in the order in which they here stand, as the crosses of either of these breeds with the Merino would thrive well, not only on the best land and with cultivated food, but would do so also on second or third rate land and a moderate supply of cultivated food, which the well-bred Lincoln would not do.

The raising of early lambs for market is an industry that is largely carried on in America. In connection with lamb raising the following experiment, recently carried out at the Colorado State Agricultural College, may prove of interest:—

- 100 Shropshire ewes, served by Shropshire rams, dropped 94 lambs—7 sets of twins.
- 100 Shropshire ewes, served by Dorset rams, dropped 130 lambs—40 sets of twins.
- 100 Dorset ewes, served by Dorset rams, dropped 134 lambs—33 sets of twins.
- 100 Dorset ewes, served by Shropshire rams, dropped 90 lambs—no twins.

Figured from the side of the ewe, 200 Shropshire ewes half served by Shropshire rams and half by Dorset rams, produced 224 lambs and 47 sets of twins. 200 Dorset ewes, with same service, produced 224 lambs, with 33 sets of twins. Figuring from the side of the rams, 200 ewes, half Shropshires and half Dorset, and all served by Shropshire rams, produced 184 lambs, with 7 sets of twins. 200 ewes, the same as above but served by Dorset rams, produced 264 lambs, with 73 sets of twins.

It is evident from these last sets of comparisons that the prepotency towards the production of twins lay with the rams and not with the ewes. It is generally conceded in the United States that the Dorset is one of the most prolific sheep.

The lambs from the Dorset ewes dressed 22 lb. by the time they were 69 days old, averaging 49 lb. live weight, while the lambs from Shropshire ewes required eleven days longer to reach the same weight.

As fast as the lambs were sold the ewes were taken off from grain feed, and when the last lambs were gone the ewes were shorn and turned out to pasture on the native grasses until the next winter. The same method was adopted the following year, except that, as the lambs were dropped a little earlier, they were allowed to grow a little longer before they were sold.

Taking into consideration our much more equitable climate in W.A., we ought to be able to obtain as good if not better results.

In Canada, also, the raising of cross-bred lambs for market purposes has been extensively undertaken, and the live-stock associations of the provinces are real live institutions. At the recent Provincial Fat Stock Show, held in Ontario last December, the block test was applied to a number of sheep by the judges; the sheep were killed, dressed, and a number of the leading experts of Canada were asked by the Dominion Sheep Breeders' Association to judge the carcasses.

The sheep represented were:—Cotswolds, Leicesters, Dorsets, Southdowns, Oxford, Hampshires, Suffolks, Lincolns and Shropshires. The judges were asked to judge from a consumer's standpoint. This was a big order to undertake, since the taste of a consumer varies so widely. One of the judges came from the United States, but the opinions given are from the local judges. The awards for lambs were given to the Shropshire. The mode of judging, as explained by the judges, was:—"Each sheep was cut through at the same place, nine ribs to the fore-quarter, and through to the backbone, so that we could see where the lean meat is, because, if we get the proper meat where we cut them in two, we are almost sure to get that lean meat all through the animal." The weight of the prize lamb was 52 lb. The verdict on the Oxford Downs was that they carried a great amount of lean

meat all the way through, and in addition have good legs that will command a good price. Some of the Dorsets were admired very much. One of the judges who had lately returned from England, where he went to study the meat export trade, stated that he found the carcasses of mutton weighing from 60lb. to 65lb. the most saleable, having due respect, of course, to the quality of that weight. He read an extract from a letter received from Messrs. Crampt and Biers, one of the largest salesmen in London. They claim that a cross between a Lincoln or Cotswold, or Leicester, or a Hampshire Down, or South Down, or a Shropshire—a cross between any of these—would meet the requirements of the British market. It will be noticed that the Merino is left out of the list. In Chicago the best cross for the stock market has the Merino as a foundation. One of the judges gave the reason of the black-faced sheep of Scotland bringing a high price in that they had to hustle all the year round, and that meant exercise for them, and exercise had a tendency to develop lean meat. On the same principle the Merino should bring as high if not a higher price than the Scotch black-face. But what is more to the point here is that the verdict of the Canadian judges upholds the conclusion mutton raisers in Australia have come to, viz., that the Shropshire, whether as a grown sheep, a lamb, or same crossed with other types, is the most profitable mutton-sheep that can be bred.

In connection with the above test the following table, giving the average live weight and the percentage of shrinkage after dressing, may prove of interest.

Breed.				Average Live Weight.	Per cent. of Shrinkage.
Southdown	...	...	...	167	38
Shropshire	...	...	...	153	44
Cotswold	...	...	...	173	45
Suffolk	...	...	...	195	46
Dorset	...	...	...	139	48
Lincoln	...	...	...	194	43
Leicester	...	...	...	159	41
Oxford	...	...	...	181	41

The Suffolk, although weighing heaviest, have a large percentage of shrinkage, and give a net yield very little above the Southdown. The judges further stated that if a sweepstake had been offered of all breeds the Dorset would probably have won it; the leg is plump and well proportioned, and the meat throughout fine and even.

An Imported Guernsey Bull for sale, cheap, present owner has had him for 4 years and has to change on account of his own heifers coming in. Particulars can be obtained on application to Secretary, Department of Agriculture.

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

WOOD-SWALLOWS.

Here we have a family of birds of which the species are spread completely over our island continent. This is much to its advantage and its cultivators. In their habits they are useful, in flight graceful, and in their zeal to subdue noxious insects, untiring.

One day's observation of any of its members would certainly teach us something of the value of their presence, for they are thoroughly insectivorous. Being migratory, the southern one-third of the colony receives a bird wave of immigration with the incoming of spring, and a consequent emigration northward in autumn. Swallows, as we understand them in the vernacular, are in some cases cliff-builders, in others house-builders, *i.e.*, builders against cliffs and houses. In this family we know all its species to be tree-builders, or denizens of the woods, that is to say wood-swallows. Because termed wood-swallows it is not to be understood they are the only wood-swallows, as we know of a species of true swallow that lives in the bush and builds its nest in a hollow of a tree.

WHITE-BROWED WOOD-SWALLOW (Martin, Summer-bird),

Artamus superciliosus, Gld. . (*Ar'ta-mus su-per-sil-i-o'sus*.)

Artamus, a butcher; *super*, over; *cilium*, eyelid.

Artamus superciliosus, Gould, "Birds of Australia," fol., vol. ii., pl. 32. "Key to the Birds of Australia," Hall, p. 48 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 8, 6, 4, 3.

KEY TO THE SPECIES.—Under surface of body vinaceous chestnut; a broad white eyebrow; bill long and pointed, the culmen exceeding the length of the hind toe and claw.

I am not aware that any record has previously been made of finding this species in our colony. This doubtless is the first. Several specimens have been sent to me by Mr. J. P. Rogers from Derby, and being a migratory bird, north and south, it surely is well known somewhere in the central districts. Our knowledge of the time and course of migration of our birds is very meagre, and we have a deal to learn. Facts relating to insectivorous birds should be well known. The annual arrival in southern Australia is between the latter end of October and the early part of December, varying as the grasshoppers are early or late in appearing. On so common an insectivorous bird very little more than a general notice has been given hitherto, so that I reproduce here from the "Insectivorous Birds of Victoria," a portion of a series of observations made by myself in 1895. Reference is also made to *A. personatus*, both species being flocked together.

Previous to settlement for the season they show a considerable knowledge or instinct, and generally seem to choose a locality where, for the season, insect life is specially abundant. At the same time it is noticeable that a certain number are generally associated with a distinct area. Hawking singly, in pairs, or in a



WHITE BROWED WOOD SWALLOW

flock, constantly assembling upon the grassed ground, they raid. In the latter case they move by jump motion. Often does a single bird (but never a silent one) choose a pinnacle, some twenty feet high, upon the upper portion of a tree, and settling itself to the

business of the evening, leaves its headquarters in direct pursuit of a dipterous or other winged insect. Returning, it essays another chase, continuing to repeat the same for a considerable time, soaring downwards, and winging its active, upward, way by a series of rapid flaps. Previous to entering upon the serious portion of life—nesting—the birds assemble in flocks amongst the lower portions of the higher leafy vegetation, causing a vocal din such as one would not expect from a group of birds so graceful in their movements. The harsh, sharp, and powerful chirps of a hundred birds, continuously repeated, are not as pleasant (at all events somewhat modified) as in the sobered parents of 21 days later. I remember a large flock of the swallows taking possession of a cluster of timber in which were a black fantail, its mate, nest and eggs. Only occasionally could the little bird be heard. It tried, and generally succeeded, after they had retired for the night.

The second of a weekly visit showed their desire for nest building had in part set in, and the constructions were completed in one or two days. Some were rapid in work, while others appeared to idle in comparison.

A clutch of eggs was observed on the 8th November, with the birds still in flocks on the 17th of the same month. With this species both sexes incubate. The young of others were on the wing by the 23rd, but before leaving the nests a relic of inheritance was distinctly noticeable in the horizontal and perpendicular motions of the short-plumaged tail. It is in perpetual daily motion, and agrees with the day movements of those of the parents. The fledgling, when taken from the nest, announced itself by two calls, one imitative of the general note of the mother, though more broken and feeble, and the second of fear. The latter was the result of being away from its nest 15 minutes. This bird we endeavoured to domesticate, but without success; it refused to eat. The eggs varied in markings slightly, with a deep or light ground colour, one egg in a set of three had the zone of spots at the narrow end, the other two were normal. They differed on the average only a shade in dimensions, and in the number to a clutch from four to two. Of twelve nests observed, three contained four eggs, six three eggs, three two eggs; all well incubated. The nests, though slight in structure, were generally faithfully built of rootlets or grasses, or more often twigs and grasses, and in many cases artistically arranged. They were seldom above 6 feet from the ground, and placed in all manner of places, preference being given to perpendicular slight stems, though nearly as often placed upon the horizontal firm twigs or branchlets of assorted shrubs and bushes. One nest was placed in the socket for a padlock slip-panel, a second in a furze or whin hedge, many in bushes of the same or in *Leptospermum*, others in acacias as jam wood, fewer in eucalypts.

That these two members were here in considerable numbers may be deduced from the fact that 40 nests, building, tenanted, and

vacated were observed by the writer on the 16th December, within a mile's walk, and nearly within the straight line lying between its termini. Two orchards, a belt of furze or whin, and an almost dry watercourse had to be passed by. The nests were placed in the orchards more numerous than in the legume whin, the areas being equal. Plum, pear, apple, and cherry trees received the nesting honours. One nest was placed in a "sweet briar" low to the ground, that is about 2 feet from it, in a township. My chord of generosity was somehow struck, so I placed a piece of stone in the nest, in order that the birds would be saved more serious distress later on. Next week the nest was gone, so would have been the eggs but for the stone.

On a previous occasion I referred to the sensitiveness of this bird. Its hardihood is now the chief feature, for no less than seven times was a nest in a young elm, enclosed within a guard, destroyed, this being done to save restless boys from making investigations and damage to the structural beauty of the tree. Each time the nest was bodily taken away, leaving only a remnant, the birds would persist in re-building it within the same fork, till the seventh part edifice was destroyed, and I have no doubt they then sought pastures new, for no further attempt to build was made in that tree.

Nest.—Similar to that of the following species. Several nests may be placed in orchards.

Eggs.—Similar to that of the following species, though varying greatly. Obsolete marks of greyish brown appear as if beneath the surface.

MASKED WOOD-SWALLOW,

Artamus personatus, Gld. (*Äv'ta-mus per-son-a'tus*.)

Artamos, a butcher; *personatus*, masked.

Artamus personatus, Gould, "Birds of Australia," fol., vol. ii., pl. 31. "Key to the Birds of Australia," Hall, p. 48 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 4, 3.

KEY TO THE SPECIES.—Under surface of body beautiful grey; rump and upper tail coverts ashy-grey like the back.

MALE.—Face and throat jet black.

FEMALE.—Lighter in markings of head and throat.

This species is insectivorous to a nicety. When opportunity occurs it shows an interest in an apiary. Some day bee-keepers may need to experiment and inoculate the insects against the birds. Could some simple plan be recognised to make their bodies taste objectionable without interfering with the manufacture of nectar into honey, it would save many bees. The same experimenter might keep before him inoculation for "foul-brood." Stranger things have happened. Seemingly, in the east, it does not despise the odorous pear slug, according to a market gardener, who further remarked to me "an odour so powerful that we are obliged

when picking fruit to keep to windward of greatly invested trees, and leave them to the care of hellebore and summer birds." There is little doubt about the former, but I question any special service by the latter. Fortunately we do not require its services for this orchard pest.

Spring sees a struggle in vocal development, its usual rapid, rasping-note being left aside for a moment or two occasionally, and an endeavour to pour forth a bar of melody for the benefit of a member of the gentler sex of its kin is made. The effort is great, and the result, though comparable to the song of many of the bird fauna, falls feebly and brokenly upon the ear of one accustomed to better results from such an effort. However, it is a decided advance on the little varied croak that early becomes ordinary.

In 1895 I noted this species did not appear to build as early as the following, and nature favoured the depositing of two eggs as a clutch in the majority of cases. Of eighteen nests personally observed, five contained each three eggs, eleven contained each two eggs, two contained each one egg. The young were, as a whole, well advanced in the eggs, and other nests with plumaged young had two in each.

Just as the manner is with many other birds, so it is with these, that of flying angrily and boldly at you as you observe the perfect quiet of their young in the nest. The mother bird is more retiring in her fear, and the persistent darting flights, almost direct to the intruder, devolve upon the male. The interest in watching their movements is about as keen as in many other families.

One Christmas eve I observed that two young were about to fly from a nest built in an odd-looking piece of dead timber near the ground, which I had watched for eight days previously. One would serve as a cabinet representative specimen, so I withdrew it at 7 p.m. For an hour and a quarter I kept fifty yards away, watching other birds, and returning then I found the parents had removed the remaining young swallow, probably for preservation sake.

Meanwhile I had extracted three fresh eggs (the third one laid the day previously) from another nest of this species, and placed therein the young bird mentioned. The layer of the eggs returning at once, looked astonished, but immediately and carefully gathered the young bird under its plumage. Continuing this mild experiment, the young feathered bird was now extracted, after being there for fifteen minutes, and a member of the white-browed species, born two days previously, was placed in the nest. The proprietor female bird returned, and a second time gently covered the creature, this time almost a featherless one, as if it belonged to it, and the loss of three eggs was purely a philosophical matter. This young bird was taken through its cradled course of life by the ninth day later, and released on the same day as the two in the nest

from which it was removed. The young of the previous species at 24 hours of age are downy and well stored with vitality. The last movement of one made in methylated spirit was the drooping of the neck and head upon its chest after 20½ minutes had elapsed from the time of placing it in the bottle.

The majority of nests observed were loosely constructed, but where fibrous roots were with ease available, invariably they were used, and the results were compact nests, neatly arranged. The birds gather the constructive material in the vicinity of the place chosen for the nest, and seemingly do not care to move away from it.

A typical example is easily noticed in the case where a fence divides an orchard from a gorse field, for on the orchard side, 10 yards from the fence, you will find nests constructed wholly of fruit-tree fibrous rootlets, while on the gorse side each nest is composed of grasses and twigs that can be gathered amongst the bushes. There are, of course, exceptions.

Three characters of material appear to be used, though they pertain possibly more to local influences, and may have but little weight in a wide study of the *artamida*. 1. In orchards, rootlets of the trees, internally fine, but with coarse mantling. 2. In lightly-timbered paddocks, grass stems principally, chlorophyll-bearing before completion; occasionally a few horsehairs. 3. In well-timbered country, twigs of the trees, with a finer internal lining of linear leaves.

The bowls of all the nests are similar in dimensions, but those of the complete structure may vary occasionally to twice the normal measurements. The positions, as with the previous species, generally ranges about 6 feet, and often enough only 2 feet from the ground. Nests are placed higher in occasional places here, but with the exception of *Pinus insignis* and a few species of eucalypti and acacias, the rule is, low to mother earth. The two species build promiscuously, favouring a break of low scrubs, which is used for this purpose. The nests are placed in prominent positions, each species as a whole keeping together, but intermixed in both cases with several of each other incubating in their midst.

By the middle of December, many of each species were preparing homesteads for the third brood, and they seldom use the nests of a past family for a future one. Late builders were observed in the early portion of January carrying twigs. In the northern portion of the colony most small birds lay in March and April, while others will lay in June. They vary in nest building according to the rainy season. The birds in the south breed in the spring and early summer. After sundown those birds not engaged in the night tasks of caring for the young or eggs, congregate in bodies of from 10 to 15 close to each other in a tree or shrub convenient to the nests and near the ground. It may be a large fruit tree, a sweet briar bush, or one of many other vegetable forms.

With both kinds I find an egg is deposited each day, and the first of the clutch hatches out on the twelfth day of sitting. The young of the two species fly upon the eleventh or twelfth day from hatching, subject to a slight variation in a number of broods.

Nest.—Saucer-shaped; twigs externally, with finer grasses within them; very flimsy or neatly made. Further reference above.

Eggs.—Two or three, sometimes four, to a sitting. The under surface may be light brown, or light green occasionally, and all blotched with light or heavy brown. Length, 0·8 inch; breadth, 0·7 inch.

WOOD-SWALLOW,

Artamus sordidus, Lath. (*Ar'tā-mus sor'di-dus*).

Artamos, a butcher; *sordidus*, greyish-brown.

Artamus sordidus, Gould, "Birds of Australia," fol., vol. ii., pl. 27. "Key to the Birds of Australia," Hall, p. 48 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 5, 4, 3, 2.

KEY TO THE SPECIES.—Under surface of body dull brown; chin scarcely any darker; back and rump brown; two or three quills of wing edged with white; bill long and pointed, the culmen exceeding the length of the hind toe and claw.

The habitat of the present species is in the southern part of the colony. Being the least migratory of any of the wood-swallows, rather we should recognise it as a local member. Further north, especially near Geraldton, a second and similar species (*A. Melanops*, Gld., black-faced wood-swallow) is generally to be seen. It has a narrow blackish frontal line; rump and upper tail coverts narrowly edged with white, those of the female being broadly edged.

The birds have the peculiar habit of closely hanging like a hive of bees. *Artamus sordidus* is a particularly pleasing bird when on the wing, its graceful soar making it a general favourite in all parts. Like the other members it displays no fear of man, and hunts the haunts of the garden for insect food with the greatest of confidence. The nesting season is September to December, and as to what kind of timber in which it will place the nest it is not at all particular. Some birds consider this important. The disposition of either sex is very gentle, and much can be done with them as described with the rarer masked species.

Nest.—Very similar to the preceding two species. The bird shows a preference for spouts of trees, at the ends of which the slight nests are placed, but the position in the timber may vary greatly.



WHITE-RUMPED WOOD-SWALLOW.



EGGS OF WHITE-RUMPED WOOD-SWALLOW IN OLD NEST OF MAGPIE-LARK.
(One half natural size).

Eggs.—Three or four for a sitting. They vary, in markings, considerably. The ground colour is usually dull white, but often nearly pure white, and always marked with blackish spots, particularly to form a zone near the broader end. Length, 0·9 inch; breadth, 0·7 inch.

The smallest of the family is *Artamus Minor* (Vieill) Little Wood Swallow. Its total length is 5·75 inches, and wing 4 inches. The rump and upper tail coverts are black, and the back brown; under-surface of body dull brown; chin scarcely any darker.

A species which seems to want a record in our southern and central districts is *A. Leucogaster Valenc*, white-rumped wood-swallow. It is known to inhabit even other areas of the continent that is dry, but at the same time provided with water courses. As well as I know it always associates with the mud lark (*Grallina*) and that, on the face of it means earth and water. Further it nearly always uses the last year's mud nest of the *Grallina*, and I only know of one case in which a pair deviated from the course of "not building its own mud nest." Why this pair should do so one cannot very well say, unless, possibly, a spirit of independence and industry controlled the pair, which, surely, is an elevating tendency. It is more northern than southern and nests on the Fitzroy River timber.

The figure illustrates the nest and eggs.

We have a species found only in Western Australia, but unless we can show cause why it should be retained as a species I fear it will have to acknowledge a partnership with *A. melanops*, Gld.

I refer to *A. cinereus* (Vieill) Grey-breasted Wood-swallow. Its under surface is ashy-grey, and this is practically one phase of *A. melanops*. In both cases the females may have the under-tail coverts broadly edged with white.

BENEFITS OF POTATO SPRAYING.

SOME STRIKING RESULTS.

Publicity has just been given by the *Farmers' Gazette* to the results of an interesting and most instructive potato-spraying experiment carried out during the past season by Mr. W. Barnes, of Westland, county Mead, Ireland. That gentleman had about twelve acres under potatoes this year, and the great bulk of these, which were of the old champion variety, were carefully sprayed with the sulphate of copper and lime solution commonly employed for that purpose. Two sprayings or dressings were given, the first on the 3rd July, and the second on the 30th of the same month. Another portion of the field, which was cropped with the same variety and was treated in exactly the same way, was left unsprayed.

The field so treated was recently inspected by a representative of the *Gazette*, who writes as follows regarding the difference between the sprayed and unsprayed sections :—

“ On that portion of the crop which had been twice sprayed the foliage was so dense and green that it was almost impossible to distinguish one drill from another, while on the immediately adjoining unsprayed plots all that was to be seen was a forest of bare stalks, all of them absolutely leafless, and many quite withered out of existence. A more pronounced contrast it would be difficult to perceive. At a little distance one portion of the field presented the appearance of a vigorous crop of potatoes at mid-summer, while the other showed hardly a trace of vegetation, because even the few stalks that remained had been withered into masses of bleached woody fibre. Here and there a few spots of disease could be discerned on some of the sprayed plants, but the extent of leaf surface so affected was so small as not to be recognisable at any distance.”

Nor did the contrast end here. Not satisfied with the results of the spraying, as indicated by the mere appearance of the tops alone, the writer had portions of the different varieties dug out, with the object of ascertaining to what extent the spraying had affected the yield and soundness of the tubers. The results here were just as striking as the appearances of the sprayed and unsprayed sections at first suggested. The appended return shows the calculated yields per acre of marketable, small, and diseased tubers on the different sections of the field :—

SPRAYED SECTION.

Large (Marketable) Tubers	...	...	15.6 Tons.
Small	..	...	3.9 ..
Diseased (a trace)	...	...	2 tubers in a perch.

UNSPRAYED SECTION.

Large (Marketable) Tubers	...	...	6.3 Tons.
Small	..	...	5.9 ..
Diseased	..	...	2.4 ..

Here, adds our contemporary, we have a remarkably instructive illustration of the advantages of syraying, because not only do we find the proportion of diseased tubers in the unsprayed crop, amounting to 15 per cent. of the total produce, but the yield of marketable tubers is reduced to the very low figure of 6.3 tons per acre, far less than half the yield obtained from the same variety where the spraying mixture had been applied.

A pure bred, pedigreed, Jersey Bull in the S.W. district will be sold cheap, if sold at once. Particulars can be obtained on application to Secretary, Department of Agriculture.

THE MORE COMMON INSECT PESTS OF THE FARM AND MARKET GARDEN, &c.

BY ARTHUR M. LEA, F.E.S.

PART I.—INSECTS THAT ATTACK GRASSES AND CEREALS.

In Western Australia, insects, on the whole, are far less destructive to fodder and grain producing plants than in many other parts of the world, or even in the eastern colonies. In America two insects are especially destructive, and commit damage estimated at many millions of dollars. These are the chinch bug (*Blissus leucopterus*) and the Hessian fly (*Cecidomyia destructor*).

In Eastern Australia and Tasmania the larvæ of two moths (*Onchoptera intricata* and *Phlegetoma carbo*) are exceedingly destructive in certain years, and will not infrequently destroy the grass, over large acreages. The first-named species lives under-ground only coming up at night time to feed, as with our cut-worms, but unlike them it constructs and inhabits a tunnel often over a foot in length. The second species is known as the "Plague Caterpillar" from the immense numbers in which it sometimes occurs, and the great damage done.

Statistics as to the amount of damage yearly caused by insects are not available for any part of Australia, and are not likely to be for some years to come; that the amount is very considerable is well known, and the figures must run well into the millions.

Speaking before the Association of Economic Entomologists at Washington in 1891, Mr. Jas. Fletcher (the then president) remarked as to the damage caused by insects:—

"By way of example I will refer to the 'Chinch Bug.' I have carefully examined the estimates which have been published concerning that particular insect, and the following are probably quite reliable and appear to have been made with due regard to all collateral considerations, as the increased value of the saved crop, the cost of remedial measures, and similar subjects.

"In 1864 Dr. Schimer's estimate, which I find was drawn up with very great care, put the loss in the one State of Illinois to the corn and grain crops at 73,000,000 dollars. In Dr. Riley's report on the Injurious Insects of Missouri, we find in 1874 there was a reliable estimate of the loss to that State by the same insect of

Mr. Lea, formerly the Entomologist of this Department, but now Government Entomologist of Tasmania, prepared some time ago for publication as a part of the *Settlers Guide and Farmers' Handbook* notes on the more destructive insect pests of the farm, etc. This part was to have been illustrated, partly with original and partly with copied or borrowed drawings or process blocks.

Owing to want of funds, publication of the *Guide* ceased. The material prepared by Mr. Lea can now be used in our present publication, and the first part now appears.

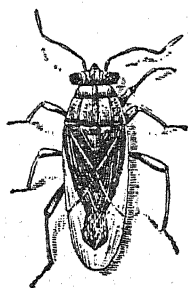
19,000,000 dollars. In 1887 Professor Osborn's estimate, founded upon the reports of the correspondents of the State Agricultural Society of Iowa, put the loss of that State on corn and grain at 25,000,000 dollars, and lastly Mr. Howard's estimate, as given in the Entomologists' report for 1887, for the nine States infected by the chinch bug in that year at 60,000,000 dollars.

"In Professor Comstock's report for 1879 the estimate of the possible loss in years of general prevalence of the cotton *Aletia* is placed at 30,000,000 dollars, through the cotton states. The injuries by grasshoppers in the different States of the Union, and also occasionally through the British North American provinces, have been so enormous that figures hardly give an idea of the injury they do, but they are known by all to be enormous.

"The amount of damage done to crops every year is so vast that the figures excite incredulity from those who do not study crop statistics. The agricultural products of the United States are estimated at about 3,800,000,000 dollars. Of this it is thought about one-tenth is lost by the ravages of insects. This is in many cases unnecessary. In short, a sum of 380,000,000 dollars is given up without a murmur and almost without a struggle by the people of the United States."

AN AUSTRALIAN CHINCH BUG.

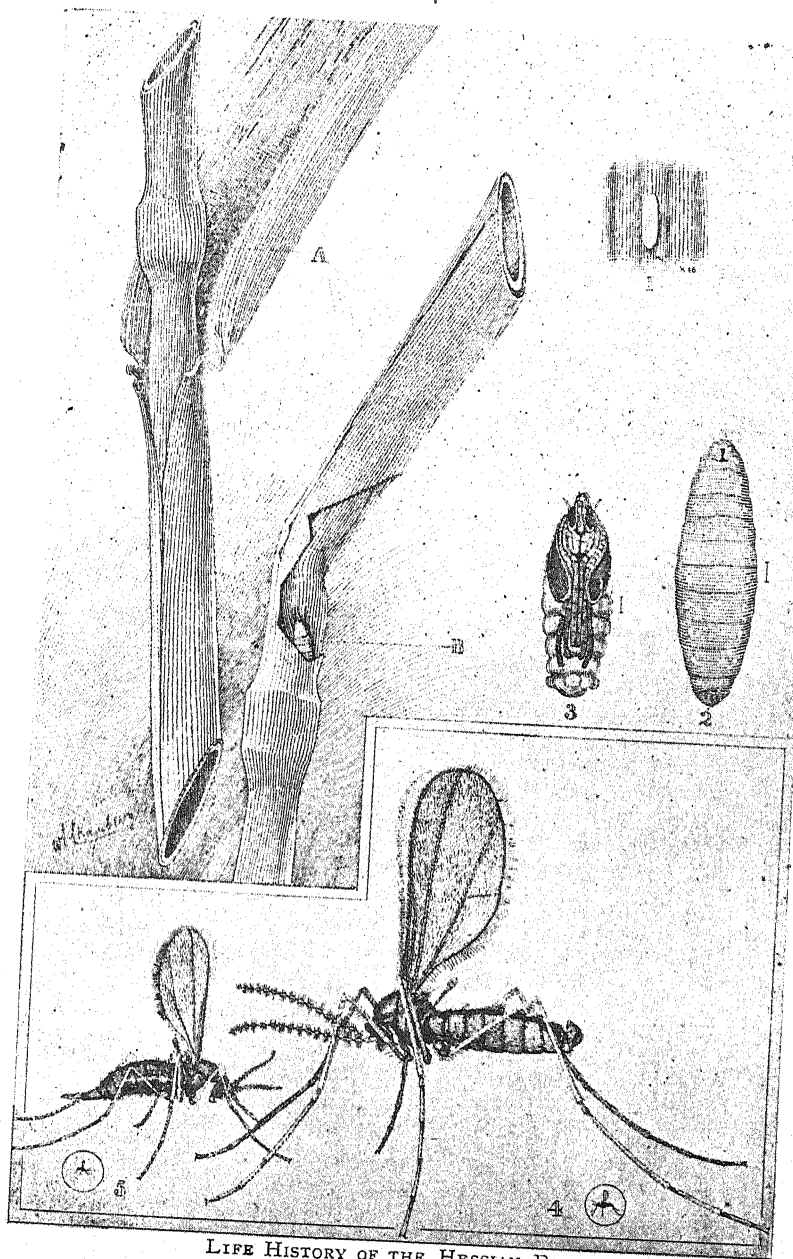
In Australia a small bug (*Nysius vinitor*), allied to the chinch bug, is very common and widely distributed; it may frequently be seen about the roots of grass, wheat and other cereals. At Pinjarrah, Beverley, Geraldton, &c., it has been seen in various stages attacking the wheat; the stems attacked were drooping and of an unhealthy colour. The bugs were most numerous just above the ground, but also occurred at the tops of the wheat and just below ground. This bug may frequently be seen on the fig, grape, &c. It is about one-sixth of an inch in length, and of a greyish colour, the body is more or less brown, and the wings of a greyish-white, the legs are yellow and speckled with brown. The young are more or less red, and are wingless. Light



Chinch Bug.

has a powerful attraction for this species, so much so, that on occasions it may be seen in miniature clouds around lamps. A fungus disease is known to destroy large numbers of the true chinch bug, and could possibly be used against this species.

This bug, or an allied species, is the one figured and described by Mr. C. French in the first volume of his "Destructive Insects of Victoria," as the "Rutherglen Fly."



LIFE HISTORY OF THE HESSIAN FLY.

1. Egg on Leaf of Wheat.
2. Larvæ.
3. Pupa.

4. Female, Enlarged.
5. Male, Enlarged.

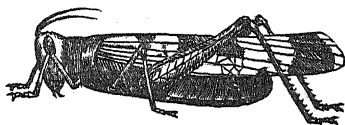
A. and B. wheat infested by Fly Larvæ and Eggs.

THE HESSIAN FLY.

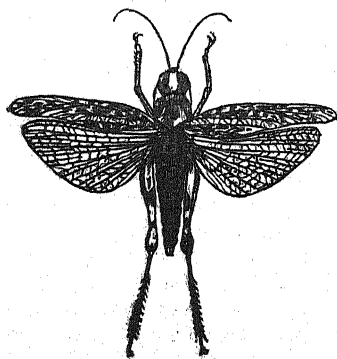
The Hessian fly (*Cecidomyia destructor*) has been introduced into England and New Zealand, and will probably appear here in time. The stems of plants attacked by this pest bend or fall over, and on examining the spot where the bending starts, a small maggot may be seen; in the case of very young plants the maggots frequently live beneath the surface, and cause them to grow in a bunched manner and without sending out central stalks. There are numbers of other small flies that destroy wheats and grasses much as the Hessian fly does, but to a much less extent; about the Swan several species destroy young and succulent grass, but so far they have not been seen attacking wheat.

GRASSHOPPERS.

Migratory locusts or grasshoppers are sometimes so numerous as to become plagues. In Africa and America the damage they commit is so enormous as to be almost incredible. The locusts in their visitations devour everything in their way, even large trees being stripped of leaves and having their branches broken; in flying they form clouds miles in length and width, and which often cause partial darkness by obscuring the sun's rays, wells are choked up by their masses and even large rivers are tainted. Australia has had several experiences of such visitations. In New South Wales and Victoria some years ago the Australian plague locust (*Pachytillus Australis*) visited district after district devouring everything green, and reducing stock of all kinds to a condition of semi-starvation. It was noticed there (as in other parts of the world) that large flocks of birds followed the locusts to devour them.

*Pachytillus Australis.*

Grasshoppers when not especially numerous are still capable of committing great damage, as they destroy more than they eat, they will eat the base of a leaf, and when the leaf falls over desert it, so that in the course of its lifetime one grasshopper may destroy several hundreds of leaves.

*Edipoda, sp.*

A species (*Edipoda*, sp.) somewhat similar in appearance to the plague locust, is also very destructive in West Australia, especially in the Beverley district. It is very abundant in the open, being seldom seen where there is considerable shade except on very hot days. A small bird (*Artamus personatus* or the "Masked Wood-Swallow") appears

to have a particular liking for this grasshopper, and may sometimes be seen in thousands when they are especially numerous.

A small wingless species (*Heteracris*, sp.) is sometimes very destructive to grass. Owing to the absence of wings, the species, of course, cannot fly, is incapable of concerted action, and is, therefore, never likely to become a plague, except in localities specially favourable to it. These localities are clearings in forest country, open plain country, and open grassy gullies.



Heteracris, sp.

There are, of course, many other species of grasshoppers in West Australia, but the three figured above are the ones that are most destructive to grasses.

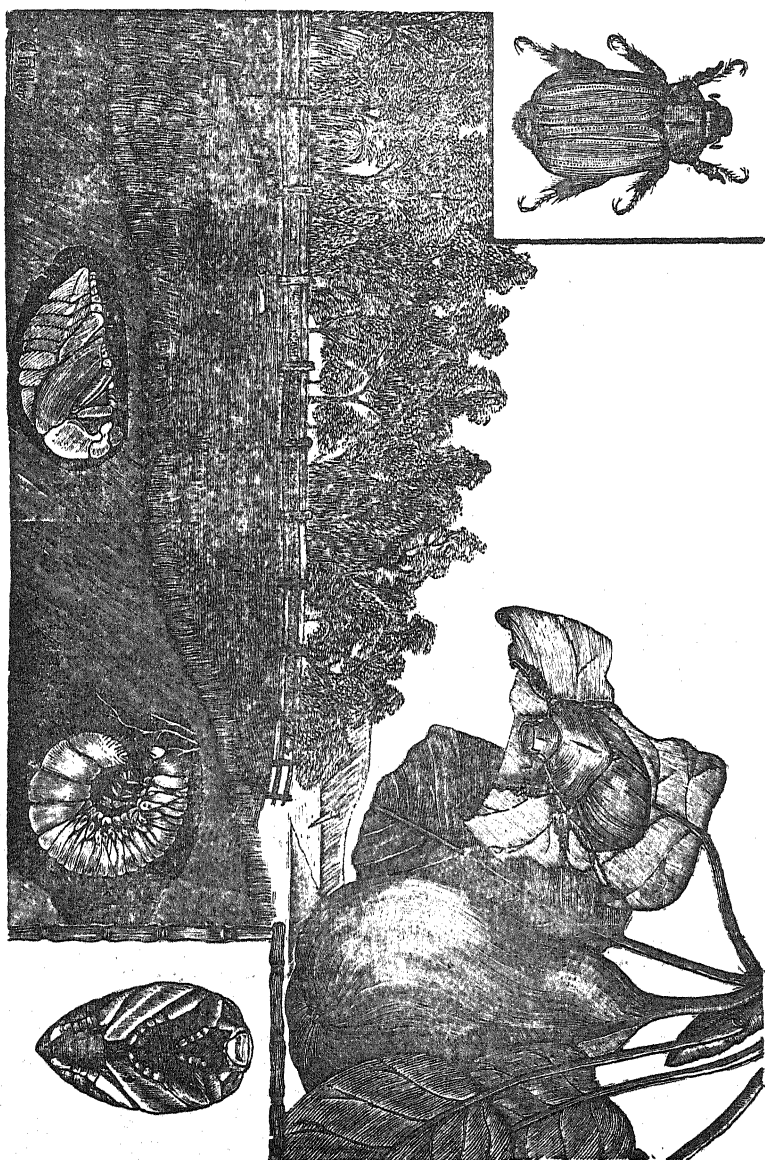
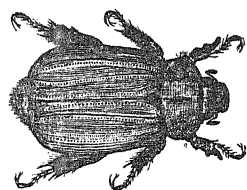
It is only occasionally that grasshoppers overstep their natural boundaries, they are usually kept in check by various internal parasites and natural enemies, such as birds, lizards, and insectivorous mammals.

In New South Wales and Victoria a disease destroys large numbers of the wingless species (*Heteracris*) mentioned above. The dead grasshoppers may be seen clinging to rushes in countless numbers. On breaking the body of one open the inside appears to be of a cheesy consistency.

In South Africa considerable success has been attained against the large migratory locust by means of a disease. This disease is artificially produced on a large scale, and sent to the infested districts, with the result that many swarms have been entirely exterminated by it, even the Kaffirs being now aware of its importance. Several attempts have been made to use this disease against our own plague locust in the Eastern colonies, but with very indifferent results.

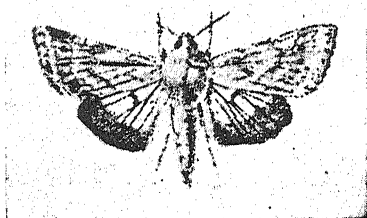
THE MAIZE MOTH.

This moth (*Heliothis Armigera*) is common in many parts of the world, and its larvæ are very destructive to cereals, especially maize, and many other cultivated and wild plants. On many occasions whole crops have been ruined by it. The larvæ are borers, and may often be seen inside cobs of maize devouring the young grain. In their very early stages, and when short of food, they are addicted to wandering. At the Greenough Flats (and elsewhere in West Australia) they occur in millions on several species of "everlastings," in particular on *Acroclinium Roseum*. On the flowers of these plants withering up they are deserted, and the larvæ wander in armies in search of food. A number of farmers about the Greenough district consider this insect so serious a pest as to necessitate a trench being dug all round their wheat and oat fields; in the bottom of this some evil-smelling compound is placed, and this kills the larvæ, as they fall into the trenches, in millions.



SWAN RIVER COCKCHAFER

"The eggs are deposited by the parent moth, in the spring, upon the stalks or leaves, especially on the undersides, and the



Maize Moth.

larvæ, as soon as they hatch, feed upon the young leaves and buds. Several broods, usually three or four, occur during the season, and it is the later of these that occasions the greatest injuries by attacking the ripening grain. Maize-cobs which are affected may be recognised by the presence of circular holes in the husk. Frequently

larvæ in different stages of growth may be found on the same plant, but when they become full-grown they all leave their food and descend to the ground, when they change to the pupa state after making an oval cocoon, held together by silken threads.

"The full-grown larvæ varies greatly in colour and marking, but the ground colour is nearly always pale green. The typical form is that in which the larvæ is longitudinally striped with white and dusky grey. In length they measure $1\frac{1}{4}$ inches. The moth itself is exceeding variable, varying from dull ochreous-yellow to dull olive green. Frequently the fore-wings exhibit no markings whatever, whilst many individuals have the typical markings greatly exaggerated. The hind-wings are whitish, always much paler than the fore-wings, and provided with a broad marginal blackish band, suffused with pinkish. In expanse it measures rather more than $1\frac{1}{2}$ inches." (Olliff.)

The larvæ, which are inveterate cannibals, may frequently be seen inside peas and tomatoes. In America they are very destructive to cotton, and in India to the poppy.

When in exposed situations the larvæ can be destroyed by spraying with Paris green, in the proportion of one pound to two hundred gallons of water. To the water some fresh lime should be added to prevent any caustic action by the poison.

THE SWAN RIVER COCKCHAFER.

The larvæ of certain beetles known as cockchafers are very destructive to the roots of many plants, but especially of grasses. These larvæ are usually large fleshy curled grubs, of a white colour with yellow or brown heads; the tail segments usually appear dark, from the quantity of earth swallowed with the roots showing through the skin. Only one species (*Anoplostethus Opalinus*) appears to be common in West Australia. Of it Mr. A. Muir, of Mount Barker, writes:—"I am forwarding some larvæ that have completely destroyed a crop of barley and vegetables; they are in thousands under the ground, and, in patches, they haven't so much as left a weed."

The beetle itself is a large and very beautiful greenish insect, which may occasionally be seen flying about lights, and which feeds on the leaves of the pear, peach, and of other trees. It is parasitised

by two species of flies belonging to the *Tachinidæ*. The larvæ are eaten by a number of ground beetles, and in the rainy season many of them are destroyed by a parasitic fungus (*Cordyceps*). Where the larvæ are especially numerous the crop is certain to be destroyed, in consequence of which the affected areas should be ploughed over, when large numbers of them will fall into the furrows and be eaten by birds. As the larvæ live for at least two, and probably for three years before coming to maturity the land, after being ploughed, should be left idle for some months to starve them out.

THRIPS.

In damp situations many plants are liable to be attacked by minute insects known as *Thrips*. They are usually to be found on the under-surface of leaves in patches, both wingless young and adults together. Where they are present in numbers the leaves appear as if fly-speckled, and large patches are destroyed. In wet seasons very considerable damage is sometimes done to maize, wheat, etc. "In the year 1805 one-third of the wheat crops in the richest plains of Piedmont is said to have been destroyed by this seemingly insignificant little insect." (Curtis.)



Thrips.

MITES.

These animals, as their name implies, are exceedingly small. They are not true insects, being supplied with eight legs and having the body differently segmented. They are known by the technical name of *Acaridæ*, and are allied to the true ticks (*Ixodidæ*.)

Small as they are they are yet responsible for a considerable amount of damage to grass, wheat, and other plants; damage, moreover, that is often unsuspected. The "red spider" (*Tetranychus Telarius*, so injurious in dry seasons to many fruit trees) will sometimes occur in such vast numbers on grass as to entirely alter its colour and to make it hurtful to stock feeding on it. Other species live at the roots of grass, etc., or just below the surface. In almost any district in the colony (and probably, for that matter, in any part of the world) if grass tufts are broken up and sifted with a fine sieve, thousands of these minute animals may be obtained. Many of them are probably not destructive to growing plants, but others undoubtedly are.

One species (belonging to the genus *Tyroglyphus*) appears to be especially fond of pumpkins and melons. These are attacked just as they show above ground, and they frequently die before the leaves have a chance to open. On examining the dying plants with a good lens the mites (a semi-transparent species visible only with difficulty until the eye becomes trained to look for it) may be seen clustering round the collar just below the surface of the ground; below the collar the young plants appear healthy enough, but above it all is withered.

There does not appear to be any satisfactory way of dealing with these small pests.

THE HONEY BEE.

BY R. HELMS.

INTRODUCTION.

Considering the many natural advantages the greater part of Western Australia offers to agriculture, a systematic pursuit of this industry will not only prove very lucrative, but the profit derived from it should surpass that obtainable in other parts of the Australian continent. The occurrence of an exceptionally large number of flowering plants, and among them many species profuse in the yield of nectar, is an obvious proof of this assertion. Excluding the tropics, upwards of 3,600 different plants have been recorded from Western Australia, out of the approximately 9,000 species found throughout Australia, which makes about 42 per cent. of the whole. The larger orders of plants, besides, happen to be good yielders of nectar. It deserves to be mentioned that over 500 belong to the order of *Myrtaceæ* (in which the gums and ti-trees are classed); 397 to the *Proteaceæ* (which include the famous Banksias, Grevilleas, &c.); 151 to the *Epacrideæ* (heaths), all good producers of an excellent quality of nectar; 54 *Labiata*, an order famous throughout the world for containing the best honey plants. The large order of *Leguminosæ* (pod-bearers) includes 460 species, 349 of which have flowers similar in shape to the pea-blossom, and 111 belong to the Acacias. All of these are free bloomers and much frequented by bees; those with the pea-blossom-like flowers, on account of their nectar (which is easy of access), and the Acacias principally for the pollen which they produce in profusion. As pollen is much required during early spring for feeding the larvæ, these trees are very valuable on account of their flowering at an opportune time.

A great number of the best nectar-yielding plants produce flowers over an extended period, and, with the great variety found almost everywhere, a succession of different flowers can, as a rule, be relied on in most localities. The fact is that except during a short interval between the height of the dry season and the beginning of winter, some species or other comes into flower all the year round and probably will produce sufficient nectar to keep the bees in food without having to fall back upon their stored supplies. For this reason the greater part of the honey accumulated during the time of an abundant flow of nectar becomes available for the benefit of the bee-keeper.

Another advantage is our mild climate. Naturally the bee requires a warm climate and cannot thrive without artificial protection in latitudes visited by heavy frost. In Australia no provisions for "wintering" need be made, and a great deal of labour and a considerable amount of risk and anxiety is thus obviated. Moreover, wintering means extra expense, as either specially con-

structed hives, with double walls filled in between with chaff or straw, have to be provided, or the stocks have to be cellared. On the whole, bee-keeping is much easier in a mild climate than in a cold, because to winter bees well in a vigorous climate and without incurring a loss is considered the masterpiece of bee-culture.

Yet in spite of climatic disadvantages, and the limited time annually during which flowers appear, bee-culture proves a profitable industry in the United States and Canada. Even in densely populated Europe where agriculture has left but limited areas in their pristine conditions and bee pasture is consequently incomparably scarcer than in almost any other part of the globe, bee-culture in skilful hands is made to yield handsome profits. In Germany for instance, where flowers are found for scarcely more than five months of the year, and naturally during seven months the bees must live upon the stored provisions (which moreover are mainly gathered within three months of the season when the flowers are at their best, the other two months probably producing little beyond the immediate acquirements of the bees), the industry yields from 10 to 100 per cent. profit, according to more or less favourable seasons, localities, or other conditions.

If then in countries subject to the disadvantages of a vigorous climate and in which, owing to the land being extensively cultivated for agronomic products, the natural distribution of nectar-yielding plants is much interfered with, agriculture is found to be profitable, it cannot fail, if rationally pursued, to pay well in Western Australia.

The advantages lie in every direction: flowers are produced during the greater part of the year; many of the flowers yield proportionally more nectar than those of other countries, and some, at times, quite phenomenal quantities (particularly the banksias, grevilleas, gum-trees and some ti-trees); the labour is lessened to nearly the half, as no special provisions for wintering require to be made; the expense is less in the outset as pointed out; no risk of loss through unsuccessful wintering is incurred; the large area of unoccupied land found even in the most cultivated districts provide bee-pasture every where and promise a four-fold harvest of honey and wax what, compared with, may be expected in the less favoured countries mentioned; and on the whole the climate is naturally favourable to bees, as sudden changes in the temperature rarely, if ever, occur to cause anxiety to their keeper.

Besides making apiculture more profitable, the art is made comparatively easy by the favorable conditions just pointed out, which are moreover considerably assisted by the modern appliances readily obtainable everywhere from dealers, or which may easily be constructed locally. Considering also that the pursuit of bee-culture, although not suitable to absolutely feeble persons, requires no great physical strength, and therefore is well adapted for those who may find heavy tasks too toilsome, it is a surprise that this lucrative industry is not more extensively cultivated. It requires

no tilling of the soil, nor is the land exhausted by the production of honey. Nor do bees have to be fed (except under unusual circumstances), for they forage wherever and whenever nectar is secreted by flowers and feed, whilst they accumulate for later requirements the sweet globules they have gathered with unceasing activity.

Although each flower produces only a minute quantity of nectar, it is almost incredible what an immense mass is produced in the aggregate. This would be entirely lost to man were it not for the bees which he has subjected to be his slaves. To encourage the harvesting of a free gift, which nature provides so abundantly, is well deserving the attention of every economist, since the natural wealth may be considerably increased by it.

The import of honey into Western Australia amounted, during 1894, to 42,949 lb.; during 1895 to 98,536 lb.; and increased further in 1896 to 163,135 lb. Instead of thousands of pounds being sent out of the country a large sum ought to come into it through the export of this pleasant and wholesome article of food, for which a good demand exists everywhere and which is steadily increasing.

Wax, another valuable product of the bee, is worth from £140 to £160 per ton in London, and finds always ready sale. But up to 1895 only £10 worth has been exported from Western Australia, whilst tons of it might easily be produced annually.

The utilitarian benefit derivable from bee culture does not end at the direct profit obtainable from it. There is still an indirect gain to be derived from these busy insects, namely—that of assisting in the production of more and better fruit. Orchardists and vignerons cannot too highly estimate this, and, therefore, would do well by keeping a few hives in their fruit gardens.

It is a well established fact that cross-fertilisation produces finer fruit than self-fertilisation, and is often absolutely necessary, more particularly with pears and cherries. Numerous instances might be quoted where plants entirely depend upon the agency of insects for their reproduction; as this, however, does not lie within the scope of this essay it is not requisite to give details regarding such well-established facts. It is an axiom that Nature abhors self-fertilisation. Her tendency is to cross-fertilise, and to accomplish this with plants these have evolved nectar-secreting glands, and in order to attract insects towards the minute but luscious morsels lying concealed at the base of the florets, they emit diversally scented odours or display showy colours. As the insects pass from flower to flower to satiate their craving, they convey the fertilising dust by means of their hair or appendages from the anthers of one to the stigma of another, and in this manner become instrumental of cross-fertilising them.

As the greater number of the principal orders of insects, during the whole time of their mature existence, are unconsciously active in assisting fertilisation, it would appear that one particular species

could not play a specially important part. But on reflection it will be seen that by its habit of life the honey bee contributes quite an extraordinary share towards this object. Bees are not solely attracted by the nectar to feed upon it themselves, but they gather the same to feed their young with as well; and instinctively (or is it forethought?) accumulate stores for the support of the colony. Under this impulse they work from morning till night, and in the course of a day visit many hundred flowers in succession, whereas other insects, whose young feed differently, visit the flowers entirely for their own benefit, and may pass over less than a dozen in a day. Besides nectar, bees also collect great quantities of pollen grains, which are the male reproductive germs, and store these for food known as "bee-bread." Whilst collecting the pollen they become, as is obvious, specially active in conveying the ripe grains from flower to flower, and by this means assist fertilisation in a broadcast manner.

The bee is deserving cultivation by the fruitgrower for the following reasons:—That when a number of fruit trees come into blossom other insects may not be present in sufficient number at the time of the year to assist in an effective fertilisation, whereas the domesticated insects would be ready on the spot to do the work; and being imbued with a desire to accumulate stores for the maintenance of the extensive family, known as a colony, they would industriously go to work and visit every flower at hand.

Unfortunately many fruitgrowers still labour under the false impression that bees damage fruit, more particularly grapes. As bees feed only on sweet substances, which they can transform into honey, they have no inclination for the flesh or the juice of fruits. Only when birds have damaged the grapes, and when later, by the wilting of the berries, minute crystals of sugar are formed near the edges of the damaged parts, the bees will frequently be found licking these up. Finding bees busy at damaged grapes no doubt gave rise to the erroneous assertion that they do the damage, as well as being accused of gnawing holes in other kinds of fruit, which, however, is done by several kinds of wasps, and as these are near relatives to the honey bee, this kinship may have helped to injure their reputation.

The direct and indirect material profits achievable by agriculture are not the only gain this industry offers. There is still another and very important advantage to be derived from it. This is the elevation of the mind and the moral influence the pursuit has upon those engaged in it. Those who diligently follow this interesting industry are led to reflect, and will derive a great deal of pleasure from it. Bee-keeping has frequently been called an art, and justly a science. But it deserves such encomiums only when it is rationally cultivated, and with intelligence. Baron von Ehrenfels, a famous Austrian bee master, calls apiculture "The Poetry of Agriculture," on account of the many pleasures he derived from the study of his insect friends. All other bee masters of fame speak with en-

thusiasm of the virtues and intellect of these little creatures. Their unceasing industry, their filial and maternal devotion, their pluck in defending hearth and home against foreign aggressions, their cleverness as builders, their cleanliness and other sanitary provisions; these, as well as many other traits, deserve emulation. Even their few vices have the deep moral underlying them that it is for the welfare of the whole community when the one or the other is exercised. The jealousy of the queen, who will not tolerate a rival, is as necessary to the bee community as it is to other institutions for the preventions of party strife. The robbing propensity of some colonies is prompted by the dominant instinct to provide and store food for their offspring, the mainspring of all their virtues. The cruel treatment the drones receive when they are no longer required is, perhaps, the worst immorality bees are guilty of. But "who does not toil shall not eat," is here the principle strictly adhered to, although the drone was never made to toil, and served his purpose well in the past.

"The greatest treasure of man is a cultivated mind and the nobility of his soul!" Men who would be as virtuous as the bees without having their vices would be perfect. Such happiness is scarcely to be expected, but the intelligent bee man, who has the characteristics of bee-life so forcibly and repeatedly brought under his notice, must feel their influence. On account of its elevating nature, bee culture must be regarded as a lever of moral improvement.

PIG-KEEPING.

By "AGRED."

Success in pig-keeping, like success in most other occupations, is determined in the long run by the pig-keeper himself. He must possess or cultivate such qualities as go to make a competent caretaker of stock, and these qualities are by no means so common or so primitive as is popularly supposed. The notion that anyone is capable of feeding swine is only one other of the many fallacies connected with the rural industries, and held by outsiders that are quickly laid bare in practice. It is probably true that no other domestic animal is at once so easy and yet so difficult to manage properly as the pig, and success or failure in this important industry depends mainly upon the methods of treatment, which in turn depends upon the man himself. For this reason, it seems advantageous to indicate at the commencement of these papers upon pig-keeping, the characteristics which seem highly desirable in those employed in pig husbandry. In casting about for the attribute most worthy the position of honor, some difficulty of decision arises, so, liking for the work, infinite patience, and strong common sense are bracketed together as a trinity of

possessions that will carry a man a long way towards success. The keeping of swine is regarded by many as a degenerate, or at any rate a vulgar occupation, and that one may have a keen fondness for it, despite the unpleasant details that inevitably accompany it, is a matter of surprise to them. The hasty tempered man is as out of place in the pig yard as in the cow yard. Constant control over one's self, patient forbearance with animals that know only the dictates of nature as law, and kindness always goes far to making pig-keeping a successful business.

When it comes to choosing between the well-being of one's charges and personal comfort, the man who hesitates has lost the grasp of the situation. Regular feeding and tending, wet or dry, cold or hot, convenient or inconvenient, are indispensable. Desultory management is fatal. There must be no arrested development in pigs; they must be moved steadily onward if the best results are to be obtained.

The successful pig-keeper, then, will probably be he who thinks of his pigs first, himself second; who studies their ways and likings and conforms so far as he may to them; who is of a kindly manner with them at all times, and who takes an intelligent interest in his work. For this reason, the best tender of swine is generally the man who owns them. Very few hired men are conscientious enough and painstaking enough to give to the many details of management, that are so important, the attention they require. And as year by year the margin of profit becomes less, the importance of these details increase. Where management by proxy is unavoidable, the example of pig owners in England might be wisely followed here by giving inducements to the labourers to take an interest and a pride in their work.

But apart from all such considerations as personal characteristics, the question, "Who should keep pigs, and why?" deserves some answer. The many forms this industry may assume makes the question, "Who should not keep pigs?" an easier one to answer. From the man who has a garden plot with a surplus of vegetables to use up, to the farmer with a hundred brood sows to clean his stubbles and consume his waste, from the fancier who keeps a few well-pedigreed stock and sells the progeny at fancy figures, to the pig farmer proper who makes pork his principle product, lie conditions applicable to almost every phase of country life. Pigs may be profitably hand fed, from the day they leave the mother till the butcher's knife ends their existence, or they may be profitably reared and sold without ever having received any food directly from man.

It is the purpose of these series of papers to take up the most popular and widely distributed form of pig-keeping, and give those ready to glean some of the conclusions arrived at by practical acquaintance with the business. The lines to be followed are those which the small farmer, in whose farm-practice some intense

culture is included, would be likely to adopt; for to him an amount of pig keeping proportionate to his holding offers inducements of great value. He buys his manure, or the majority of it, in the form of pig food, and instead of being out of pocket by the purchase he gets his manure at a profit. He makes money on the pigs first, and the highly valuable manure that results from rich feeding is a perquisite to him. The productivity of his land and the contents of his purse increase simultaneously. The keeping of pigs also renders the small grower more independent of swamped markets than he would otherwise be, since it gives him another basket in which he may carry his crops to market. It also enables him to dispose of his inferior produce, and it may here be said that if the "pig class" of stuffs reached its proper destination instead of the metropolitan sale rooms, there would be fewer gluts and better prices for produce than sometimes obtain.

When the pigs are killed on the premises, and this should be done wherever possible, the offal may be most profitably utilised by being boiled, minced and fed to poultry. Where a weekly supply of porkers is turned off a farm, the residue treated as above goes far to solve the winter egg problem.

Probably the first question that concerns the mind of the intending pig-keeper is "what kind of pigs will suit me best?" He wants a few sows to start with, and will be wise to consider carefully his objects in keeping pigs. The selection of proper brood sows is an all important matter and the more one sees of pigs the more one is forced to deprecate the not uncommon practice of breeding from anything with ten teats. Unless the breeding of pedigree stock is contemplated—a procedure which no beginner should ever attempt—pure bred sows, particularly of the Berkshire breed, may wisely be avoided. The tendency of pure breeding is to refine stock, and if followed indiscriminately soon results in loss of vigor and prolificacy. Hundreds of Berkshire pigs can be seen exhibiting the structural characteristics of failing vigor, and unfortunately for the inexperienced, such pigs catch the eye, being what is called pretty. Usually they are compactly set together, fine in the points, silky haired, small eared, and of no great size. To look at, they are pleasing; as small carcasses, they are profitable; to breed from they are failures, as a rule.

It is not to be supposed these remarks are in any sense condemnatory of pedigree stock. Pure bred boars we must have. The point insisted on is that the mating of pure bred pigs is a thing entirely apart from commercial pig rearing, and is to be avoided by those who have not had experience in the matter, since considerable skill is required to maintain the vigor and constitution that are necessary in a profitable pig. There is a strong consensus of opinion that first crosses with pure bred parents are the most profitable pigs to feed, and probably this is true. But for general purposes, nondescript or grade sows, if possessed of the

qualities necessary, mated with a pure bred sire, will be found entirely satisfactory, and by a careful selection from their offspring, and with proper treatment, a herd of thoroughly reliable sows can be built up. A good brood sow is not difficult to discern from her outward appearance. In shape she should have as much length as possible; short, blocky sows may be used to breed porkers, but should never be used as stud sows. She should be low on her legs, and well set on them; she should be wide hipped and full hammed; her shoulders should but little exceed in width that of her hips; her back line should be as nearly level, right to the root of the tail, as possible; her udder, if she is seen when out of milk, should be loose and flabby, with well-developed teats. Given these points the length of her snout is immaterial. Many rashly condemn a pig with a long face, but it will often be found that the long-snouted sows' pigs are the best "doers," and this defect in physiognomy is rapidly removed from the progeny if the boar be short-faced. The hair should be coarse, harsh to the touch; there is no surer sign of constitutional strength. Her disposition should be quiet and gentle, and her age should be not less than three years. The progeny of young sows, and particularly those that are productively employed before the age of twelve months, seldom, if ever, make such good stock as those of maturer mothers. So long as a sow throws litters of good, strong piglings, she is likely to be as profitable as a mother at the age of twelve or fifteen years as at four or five. The systems practised by some pig-keepers of killing sows after the first or second litter is to be condemned. Mature sows make the best mothers in every sense. For suitability to all-round circumstances Berkshire sows, or sows of the Berkshire type, may be recommended. They grow to a moderate size, make kindly mothers, are easily kept, and their progeny, if properly treated, are rapid growers. Their main fault is a tendency to run to fat; but the principal causes of this are avoidable, viz., want of sufficient exercise, too low an albuminoid content in their rations, and the breeding from unsuitable parents, particularly on the maternal side. For lean carcasses the Tamworth strain is the best, and, perhaps, the ideal porker or light baconer is obtained by mating Tamworth sows to Berkshire boars. The outward appearance of these sows is against them in the eyes of those who hanker after the Berkshire or similar breeds, but the wave of favor that is spreading through portions of the Eastern Colonies towards the Tamworth pigs is justified in the minds of all who test them on actual results, not outward signs. It is often said that the Tamworths require more food than the Berkshires. This is questionable. The Berkshires will probably show more results for the food given than the Tamworth, for the latter is a breed that does not, as has been said, carry its beauties on the outside; but when fed together and managed similarly, it will be found that in the long run the Tamworth youngsters will yield more popular and

as heavy, if not heavier, carcasses on a given diet than the Berkshires. The litters from Tamworth sows are numerically greater than from Berkshire, and the young pigs are, as a rule, very even.

With the exception of widely divergent type characters there is more in strain than in breed, and more in individual merit than strain merit. A herd of first-class brood sows cannot be gathered together quickly.

Not much need be said about the boar. He must be pure bred. A badly-built boar with first-class ancestry is to be chosen in preference to the most excellently-shaped one with blemished blood. Not that a mis-shapen sire is desirable, but merely that breed is indispensable. A strong constitution, vigorous masculinity, and good breed character are requisite. His age, for the best results, should be anywhere between eighteen months and seven years. Some breeders kill off, after castrating and fattening their boars, every twelve or eighteen months. The practice, like that of killing the young sows after the first or second litter, is founded upon a narrow-sighted policy, which, in the long run, cannot fail to deteriorate the stock. Mature parents, on both sides, are highly desirable; on one side absolutely necessary to continued success.

FUNGUS DISEASE ON CHERRIES.

Mr. J. S. Jefferson, Inspector under the "Insect Pests Act," has forwarded to the Department of Agriculture some fruit and leaves of cherry trees, which he obtained from Mr. J. W. Hackett's orchard at Donnybrook. They are attacked by a fungus disease. The samples were submitted to Mr. A. Despeissis, the V. and H. Expert to the Department, who reports as follows:—

"The specimens submitted show two diseases: 1. The common shot-hole fungus. 2. The cherry and plum leaf spot, botanically known as *Cylindrosporium padi*, a fungus which causes premature defoliation of the affected trees, and also attacks the green fruit, which drops before it reaches maturity. This disease has never before been detected in Western Australia. It first manifests itself during the spring; reddish spots make their appearance upon the upper side of the leaf. In a short time the spots turn brown, the leaves become yellow and fall. Upon the lower side of the leaf, opposite the spot on the upper side, may be seen yellowish pustules, whitish on the border when the pustules are ripe. The use of copper fungicides, as directed in the case of shot-hole disease, is beneficial."

WEST AUSTRALIAN POISON PLANTS.

OFFICIAL REPORTS.

In the early part of July, 1895, the Bureau of Agriculture suggested to the Premier that a full inquiry should be made into the poison plants of the colony. It was suggested that the plants should be botanically classified and described (which the Bureau was of opinion would be done by Baron von Mueller free of charge); that a qualified veterinary surgeon should be engaged to ascertain the toxic properties of the plants; and their effects upon different animals; and that, as dried specimens were of no use for analysing, seeds of the plants should be sent to the Director of the Botanical Department of the British Museum, for him to cultivate and analyse the plants when they came. This, the Bureau thought, would cost about £1,000. To this suggestion the Under-Secretary replied to the effect that before such a sum could be appropriated to such a purpose the approval of Parliament would have to be obtained, and the matter had, therefore, better stand over for a time. Under date of July 13, 1895, the Bureau wrote again, suggesting that at any rate the veterinary part of the work should be done, at an estimated cost of £350, and hoping that, if the Premier declined to submit this for the approval of Parliament, he would raise no objection to the amount forming part of the Bureau's estimate for the then current financial year. In reply to this, the Under-Secretary was directed to say that the Government considered that the Bureau should first obtain the opinion of some scientific gentleman as to the probable cost and the best means of carrying out the work. It was eventually decided to make a start with the following poisons:—York-road, box, berry, and heartleaf, and letters were written to various people asking them to collect and forward about 2 cwt. each of these poisons. The work was entrusted to Mr. H. H. Edwards, as veterinary surgeon, and Mr. S. S. Dougall, as chemist.

Under date of March 11, 1896, Mr. Dougall reported that a start had been made with York-road and box, but that after treating with almost every known solvent and method of detection and determination of alkaloids, the results in each case had been nil. Experiments were then made with different kinds of re-agents and solvents other than those generally used for such purposes, but with the same results. A qualitative analysis was then made, and this showed a glucosoid or glucosoids and organic acids, either or both of which might be poisonous. The experiments subsequently made by Mr. Edwards pointed to the organic acid as the poison, and to the probable fact that the glucosoid was inert, but the evidence was not conclusive enough to justify a decided opinion. On March 11, 1896, Mr. Edwards reported that both plants had been proved highly poisonous, producing nacoto-irritant effects and causing death when eaten, even if only in small quantities. Experiments were being made with solutions derived by the

chemist from plants, which were applied by hypodermic injections, but without any very satisfactory results, as sometimes one injection would give positive results, and a duplicate injection would give negative results. On November 12, 1896, the Secretary wrote to the consulting veterinary surgeon, asking for a further report, and expressing the hope that he was not allowing the matter to hang fire. On December 19, 1896, Mr. Dougall reported that further investigation had failed to discover any alkaloids, but that the plant contained some other poison was proved beyond a doubt by the physiological investigations made by Mr. Edwards. Mr. Edwards and he were then making further investigations with fraction solutions, but the results were not satisfactory.

A contribution to the botanical part of the investigation of the poison plants was made by Mr. Bernard H. Woodward, Director of the Perth Museum, who, in 1892, was authorised by the Colonial Secretary to report on them.

In 1897 an account of the native poison plants of the colony was prepared by the Botanist of the Department, and published in Part III. of the *Settlers' Guide*. This was based on the specimens and papers then in the possession of the Department, as well as on the information that was to be found in such books and journals as were procurable for consultation in Perth. Since it appeared, a paper, by Dr. Rosseloty, entitled "Note on the poisonous action of species of *Gastrolobium* and *Oxylobium*," read at the Intercolonial Medical Congress, held at Melbourne in 1899, and published in the transactions for that year, has become available for reference in the Perth Public Library. Dr. Rosseloty's observations having been made presumably by himself personally, are of value, especially for the notes of the *post-mortem* appearances. Box and York-road, according to his account of their effects, produce more excitement in the animals poisoned by them, while heart-leaf and bloom exert a more paralysing influence. Dr. D. Grant, in some remarks on these differences, points out that they do not correspond with the botanical distinction between the two genera *Oxylobium* and *Gastrolobium*, but as the differences between these two genera are particularly weak and more artificial than natural, a comparison on that ground is not of much use. At the same time, settlers and others who have witnessed the effects of the poisons are in pretty general agreement as to the symptoms of poisoning being similar for the plants belonging to those two genera, and it is possible that the differences commented on by Dr. Grant may be only those observable at different stages of the poisoning, or that some of the symptoms may be secondary rather than indicative of the direct action of the poison on the nerve centres. Indeed, the general course of the symptoms appears to be, first, a stage of excitement of the nerve centres, with delirium and muscular spasms, followed by paralysis, particularly of the sympathetic or automatic nervous system, the death of the animal being often preceded by convulsions. Dr. Rosseloty states, with reference to the York road poison, that if the stomach

of the sheep is full before eating the poison, there is less chance of its recovery, a remark that is in apparent contradiction to the experience of others, who have observed that when the poison is taken along with wholesome food it is less harmful, and that animals by doing this, become immune against the poisonous action. He states, also, that in the first stage of poisoning, when the power of chewing the cud has been lost, this function may be restored by giving the animal salt, which, therefore, may be looked upon as in some sense an antidote at that stage. Specimens of the plants on the toxic effects of which Dr. Rosselloty's notes were founded, were submitted to Baron von Mueller, who identified the "bloom" poison as *Gastrolobium ovalifolium*, a plant greatly resembling *Oxylobium retusum*, but of a trailing or prostrate habit, while the latter is an upright shrub. The narrow leaf poison bush, about which there appears to be much confusion among settlers, was set down as a species of *Gastrolobium*, but the name "narrow leaf" seems to be applied to a variety of plants having leaves constantly narrow, or in other cases narrower than usual.

At the end of July, 1898, a circular was sent out by the Department, requesting farmers and others to forward a supply of the poison plants growing on their lands, in order that they might be sent to Edinburgh for a thorough investigation of their properties. As little response was made to this appeal, the department itself secured a supply of box, York road, and heart-leaf plants, as well as of seed of the two last named. These were sent to Fremantle for shipment in the German steamer, addressed to the Royal Botanic Garden, Edinburgh, where they arrived in May, and whence by the good offices of Professor Bayley Balfour, they were forwarded to Professor Stockman, of the University of Glasgow, who had consented to undertake the experimental investigation of their toxic action. The length of time that has elapsed since the plants actually reached their destination is accordingly not so great as might at first be thought.

The following reports, from Professor Stockman, have just been received:—

*University of Glasgow,
18th September, 1900.*

YORK ROAD POISON. *Gastrolobium calycinum*.

A supply of the leaves only was sent to me for examination. When ground up the fine powder is irritating to the mucous membranes of the nose and throat, and causes a considerable amount of discomfort and sneezing.

When the ground leaves are extracted with boiling water a mucilaginous solution is obtained, which contains a good deal of a gummy colloid material. On adding strong alcohol this latter is precipitated and can be collected by filtration, 100 g. leaves yielded 2.5 g. dried colloid matter. It has no toxic action. On evaporating the mixed water-alcohol filtrate from the above on

the waterbath, a brownish extract is obtained, the most notable feature of which is that when shaken with water it yields a most abundant and persistent froth. This frothing is due to the presence of a substance (or substances) belonging to the Saponin series of bodies, and which is certainly the active principal of the leaves. It is not an alkaloid, but it reduces Fehling's solution on boiling, and is probably a glucosoid. If the extract be treated with *rectified spirit a part of it only is dissolved, and on adding to the solution large excess of ether, a precipitate is obtained which is yellowish brown on being dried. This froths when shaken up with water. Attempts were made to obtain the active principal in a purer state, but these were not successful. I could not spare the time necessary to work it up more thoroughly, but it is only a question of time, and should present no great chemical difficulties.

The ground-up leaves were also extracted with alcohol. This leaves behind the mucilaginous colloid body, but removes resin in a certain quantity. On evaporating off the alcohol, a brown poisonous extract was obtained. By treating this with boiling water the resin is left undissolved, and a watery solution of the active principle is obtained. If this be evaporated, then dissolved in alcohol and precipitated with ether, it is further purified. The resulting body froths with water. (This could be further purified probably by precipitation with basic acetate of lead, but I made no attempt in this direction).

The *poisonous effects* of these extracts were tested on frogs and rabbits.

Given by the mouth to *frogs* the extracts cause irritation with diarrhoea and slight increase of the spinal reflexes. Probably very little is absorbed. Given subcutaneously they act as muscle poisons. The muscles in the immediate neighbourhood of the injection are poisoned, they gradually cease to contract to nervous impulses or to electricity, and the animal dies in about 24 hours. The muscles at a distance from the injection escape. The heart becomes slow and weak.

Rabbits tolerate large doses by the mouth without showing any special symptoms. Probably very little of the poison is absorbed from the alimentary canal. When given by a vein or subcutaneously the extracts caused general depression, and in large doses death. In them also it seemed especially to affect the muscles.

Box POISON. *Oxylobium parviflorum*.

The leaves only were furnished for examination.

The poison is evidently of the same nature as in the leaves of the York-road Poison. It is also a body of the Saponin series.

The leaves when powdered irritate the nasal mucous membrane. 100 g. extracted with boiling water yield a mucilaginous solution.

*The active body is precip. from this solution by adding very strong alcohol.

On adding strong alcohol the mucilaginous colloid body is precipitated. When collected on a filter and dried it weighed 2.5 g.

The water-alcohol filtrate was evaporated on a waterbath nearly to dryness and precipitated with strong alcohol. The precipitate was collected on a filter, and when dried over sulphuric acid formed a brownish mass weighing 2.7 g. A little of it dissolved in water frothed very strongly.

This extract was used for physiological experiments on frogs and rabbits.

Its action was similar to that of the extracts obtained from the leaves of the York-road Poison. Rabbits, however, are very insusceptible to the poison when given by the mouth, probably because very little of it is absorbed from the alimentary canal. The watery extract from 50 g. of the leaves failed to kill a rabbit.

Given subcutaneously or by a vein to rabbits it caused great muscular depression.

HEART LEAF POISON. *Gastrolobium bilobum*.

No exhaustive examination was made of the leaves. If they be powdered and boiled with water a mucilaginous solution is obtained as with the others. The mucilaginous body can be precipitated by adding alcohol. On evaporating the filtrate from this the extract obtained froths abundantly when shaken with water.

A very large number of plants scattered over the world contain active principles of the nature of Saponin. These differ greatly in toxicity, the highly poisonous ones being called Sapotoxins, and the less poisonous ones Saponins. Sometimes a Sapotoxin and a Saponin are present together, and it is quite possible this may be the case in York-road and box poisons.

Pigs feed freely on the *Cyclamen europaeum* (Sowbread) which contains Saponin.

When animals feed on the York-road or box poisons the best treatment probably would be to give a smart purgative such as croton oil. After the poison has been absorbed from the alimentary canal into the blood, there is no known antidote. In view of the fact that the muscles are deeply affected, complete rest for several days is indicated, as excretion of the poison is slow.

I regret that I am unable to send in a more complete and definite report, but my time is fully occupied with other and more immediate duties.

(Signed) RALPH STOCKMAN.

Enclosed are specimens of the impure Saponin bodies from box and York-road leaves.

In connection with the above reports the Government Botanist says :—"I had hoped that the scientific interest attached to these poison plants might have been such as to induce Professor Stockman to make a complete examination of their poisonous principles for the sake of the scientific results of the analysis and experiments. That, however, does not appear to be the case, as the professor finds that the poisonous bodies—Saponins or Sapotoxins—are widely diffused in the vegetable kingdom, and not restricted to the local poison plants. Professor Stockman's report, however, so far as it goes, provides a sound foundation of facts on which further analyses and experiments may safely be based. It shows that the investigation is of a laborious character, and would require for its completion an expenditure of time and material so great as to forbid him to carry it further in the interests of pure science. Although it is stated in the report that no antidote is known for the class of poisons present in our poison plants, that is not to say that an antidote may not be discovered, or that its discovery should be any the less sought for by means of analysis and experiment.

It is to be feared that the reasons compelling Professor Stockman to discontinue his experiments, may equally prevail with other investigators, who do the work for the scientific results alone; but it is possible that practical institutions, such as the Columbia Museum, may undertake the investigation on account of the importance to the colony of securing a successful method of counteracting the baleful effects of the poisons on stock. Whether they will do it free of cost is another question.

So far as immediate action in the matter is concerned, the growing season for the plants is now almost past.

SEA OF AZOF BARLEY.

During last June the Secretary, Department of Agriculture, obtained through the Agent General in London a quantity of Sea of Azof Barley, a quick-growing variety of barley, very suitable for early green fodder. This was distributed to growers in different parts of the country, and the following are some of the reports received.

Mr J. H. Twine, Newcastle, says :—

"The season has been so wet that the barley has hardly had a fair trial, that sown at the same time as several varieties of wheat has grown much quicker, is a good deal taller than them. I hope to give it a better trial next year."

Mr. W. Maley, Sans Souci, says :—

"The season was very far advanced when the barley was sown. The plants look healthy at present, and considering the coldness of the weather, have grown well."

Mr. B. Pember, Springfield, says :—

"The Sea of Azof barley has not made very good progress, and in many places where the ground was a little cold from the wet weather it perished altogether after coming up. The barley is now about 1 ft. to 18 in. high and coming out in head."

Mr. H. W. Mills, Busselton, says :—

"The barley that was sown is not satisfactory owing, I suppose, to the continued rain; it is very patchy, some portions look good, but great patches have died out."

Mr. J. P. Hammond, Beverley, says :—

"I picked the weed seeds out and sowed the barley, it has grown very well and is now out in head."

Mr. R. F. Glasson, Narrogin, says :—

"I drilled the barley in at the rate of 4 pecks per acre, with Thomas' phosphate at the rate of $1\frac{1}{2}$ cwt. per acre, it germinated early, stood well, and at present has a healthy appearance."

Mr. E. Conway, Wagin, says :—

"I sowed the barley on July 12th, at the rate of $1\frac{1}{2}$ bushel to the acre; the growth for the first two months was very slow, but during the past five weeks it has improved considerably. It is very short, 15 to 18 in. high, but it is coming into ear rather well. To obtain a comparison I sowed English malting barley, rye, wheat, and oats in the same block, all of which are higher, and excepting the oats, promise better results. I used 84 lbs. of Crown Superphosphate to the acre on the whole paddock in order to give it a fair chance."

Mr. W. W. Thompson, Bunbury, says :—

"The Sea of Azof barley which you sent to me some time ago is looking really splendid, in fact portions of it are lying down, it having grown too rank, and if we had not had such a wet winter, I am sure it would have been the best crop that was ever sown in the district. To show the value of this barley in comparison to others, a field of the common barley was sown adjacent to the one in which the 'Sea of Azof' was sown, and although the land in the former field was far superior to the other, the common barley is only about 2 ft. 6 in. high, and the new barley is from 4 to 5 ft. Everyone who has seen this field is most highly pleased with it."

Messrs. F. and C. Piesse, Katanning, say :—

"We regret to report that this barley has not done very well, it hardly had a fair chance, this season being so wet we were unable to get it sown until very late in June, consequently the growth is very short and thin. We find that the seed contained several new weeds not seen before in this district, we are afraid the seed will be almost useless, as it will be so dirty."

Mr. H. Pascoe, Strawberry, says :—

"I reaped the Sea of Azof barley, and got 36 bushels of barley from the one bushel you sent me, so it has turned out well, it is a splendid barley for both green stuff and for grain."

The result of these trials seem to show that in all districts where the land is low, and the wet has been excessive, the crop has been a failure, while in other parts it has given very satisfactory results; next winter, if the rainfall is not so heavy, better results may be obtained. Nearly all complain that the seed was dirty and full of weeds, and a formal complaint has been made against the vendors on this account.

SUMMER PRUNING AND THINNING OF FRUIT.

A. DESPEISSIS.

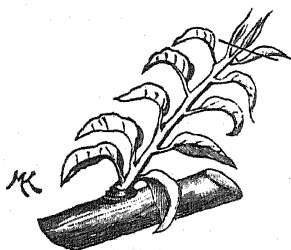
As generally understood, pruning is an operation performed in the winter time, the object of which is the shaping of the plant, the adjustment of its wood and of its fruit-bearing capacity, and the easier management of such operations as cultivation, spraying and dressing of the trees and vines, and gathering the fruit. In the summer months, however, the attention given to the plants for the purposes already named, are supplemented by operations which are spoken of as "summer pruning." In its proper sense, summer pruning consists of pinching and disbudding.

PINCHING

is the operation by which strong and vigorous shoots, which are outrunning slower growing ones, are set back in order to give those other shoots a chance of catching up to the stronger ones, or of diverting the flow of sap into other channels where it is wanted.

It consists in suppressing by nipping between the finger and thumb the tender growth of terminal shoots, without, for that purpose, removing much or any of the foliage at all. It is by pinching that trees, when in their nursery beds, are given the shape which it is meant they should assume before they are sent out to customers to be planted.

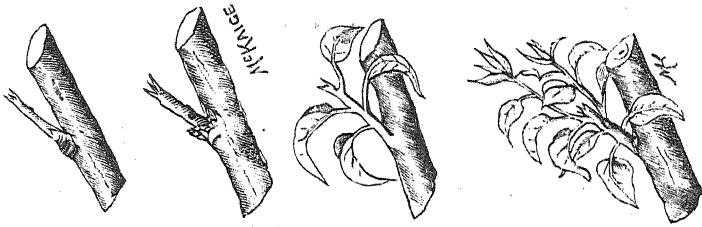
Pinching is often practised in the summer for promoting the formation of fruit buds. In this respect the following notes appear in a chapter of pruning I published in the May issue, 1898, of *The Producers' Gazette and Settlers' Record*.



Shoot rightly pinched.

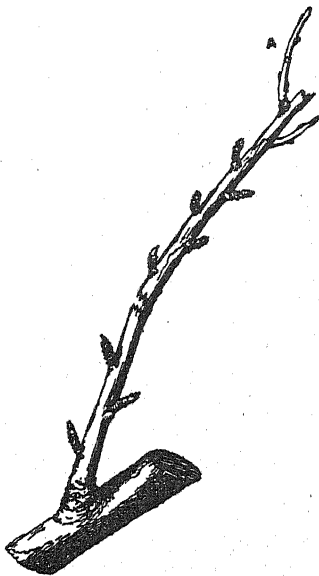
In pinching back side shoots, intended to carry fruit buds, care must be taken not to shorten them too severely, it is not too much to allow them three or four inches. If pinched too short, the little butt or shoot either ceases to grow and dies, leaving a vacant space on the branch, or else, a year or two after this excessive pinching, two small basal buds push forth on each side of the suppressed shoot; these will ultimately blossom, but this will involve the loss of another season or two, or again premature shoots will grow, which will likewise be a longer time setting to

fruit, and are not likely to be so fruitful as better constituted shoots properly pinched would be.



Shoots pinched too far back, and result in different stages of growth.

When pinching back, and especially where the tree is full of running sap and of vigor, the shoots instead of being cut or nipped clean off are half broken through, and the terminal end left hanging.



Terminal shoot partially fractured

In this way the tension of the sap is partly diverted to half nourish the broken part, and the pressure is not strong enough to stimulate the growth of side shoots on that half broken spur. At winter pruning that spur will present the appearance shown on the figure; the hanging piece will be excised, and the spur below will be found stocked with fruit-bearing buds. These, after they have perfected their internal organs—a process which, according to sorts of fruit trees, takes from one to three years to accomplish—will in due course blossom and carry fruit.

DISBUDDING

consists in rubbing off with the thumb any misplaced buds or tender shoot.

Pinching and disbudding are the most rational methods of gradually directing the growth of trees and vines, thus avoiding at the time of winter pruning the severe cutting of much unnecessary wood on which some of the plant's best energy may have been spent during the growing months.

Indeed, if literally carried out, there would be little winter pruning left to be done, except shortening the leading branches of

young trees. However, if pinching and disbudding can be made to answer a useful purpose, the beginner should guard against too rigidly carrying it out under every circumstance, as it often happens that a better root growth, and much useful shelter in the summer months against the ardent rays of the sun, are obtained by not too strictly following the rules of pinching and disbudding.

To illustrate the methods of nipping and of disbudding, no better example can be taken than that of the apricot. These trees often throw out two or three shoots from the same knot. In shaping them a good deal of disbudding has to be done, as it is essential that they should not grow in a bunch out of the main stem.

Supposing at planting time the young tree has been cut back to a stick 18 or 20 in. high, the first shoot should start 12 in. from the ground, and not more than three others at most should be left to divide the space between that height and the top of the stem. Around that stem, these three or four branches should be so disposed as to evenly balance, all other intervening shoots being rubbed off as they appear.

The first year it will be necessary to go over the trees at intervals and rub off all unnecessary shoots, thus to preserve the balance of the tree. Only strong and vigorous shoots are pinched back, any general heading back tending to dwarf the trees.

The method of cutting back the first winter has been explained in the course of a previous chapter.

When the young tree starts its second year's growth, all the shoots that come out on the underside of the main limbs—which have in the winter been cut back to 6 to 12 inches—are rubbed off, with the exception of two or three growing upward and outward on each limb, so as to continue the growth of the tree and maintain its proper balance and shape.

The following year again, when the new shoots are a few inches long, they are again thinned down to two or three leading ones on each branch, all lateral growths and water shoots which tend to throw the tree out of shape being rubbed off. In doing so care must be taken not to take off the fruit spurs. Thus a strong tree is built up, with sturdy limbs, directed in an upward and outward direction, and capable of carrying a heavy load of fruit, well distributed around those limbs. The third year a few apricots will ripen, and after they have been gathered the trees are gone over and topped.

This operation favours the formation of fruit spurs, and, moreover, prevents the dying back of the branches, which more especially with stone fruit trees, is a common occurrence when pruned in the depth of a wet winter, at a time when the sap is dormant, and its healing power is not so marked. This done, all that remains to be done is to rectify early in the spring any errors of pruning which may have been done when the foliage did not

permit of a correct view of the tree; at that time about one-half of the season's growth is cut back, due regard being paid to shape and balance, and cross shoots; water sprouts and dead branches are also taken out.

Grape vines should not be topped too early, unless they happen to be in exposed situations where they are liable to be broken by strong winds. A great many growers I have met will, on the other hand, leave this topping until late in the season, so, as they fancy, to keep down labour, and at one stroke slash back both shoots and laterals. This practice has of late given rise to much adverse comment, and by degrees it is satisfactory to notice growers are moderating the intensity of this summer slashing, and the vines in consequence are much benefited both in growth and in production.

Wherever the vines are trellised very little topping, if any at all, will be required, and the shoots after being tied up to the top wire should be allowed to droop down in festoons. When growing bush-fashion, just enough trimming should be done to enable the team and implements moving between the rows without knocking the shoots too much. This is generally done early in November, and three or four joints are left above the last bunch of grapes.

"Defoliation," which in cold and damp countries was practised for promoting the coloring and the ripening of the grapes, and thus saving them from bursting and rotting, is now seldom practised. In a more genial climate, such as the Australian one, it has nothing whatever to recommend itself, and should be absolutely discarded, all the efforts of the grower, on the other hand, should tend to provide for the grapes as much shelter as possible against the direct and scorching rays of the sun in the height of summer.



Vine cane rightly topped.

THINNING THE FRUIT

is an operation which consists in rubbing off fruit which is imperfect, insect-infested, diseased, overcrowded in clusters, and all surplus fruit which can well be dispensed with, thereby improving that which remains and sparing the energy of the tree. It is almost as important as pruning, and it is becoming to be regarded as essential to the profitable production of first-quality fruit as is pruning, cultivating and manuring. Thus in its proper season it should receive as much attention on the part of the grower. The best time for thinning fruit is after the late spring frosts and other early accidents are passed, but before they have become of sufficient size to be a tax upon the tree.

In connection with thinning, the following points are worth bearing in mind ;—Fruit trees form their blossom buds a year or two before these buds actually bear fruit. It thus follows, that if a tree is allowed to overbear, it is hardly expected that it will also nourish as it should do the ensuing season's crop of blossom buds, and these being feeble and wanting in vigor and strength will, it is more than likely, in the proper time fail to set and perfect their fruit. Occasional heavy crops, therefore, more especially on trees growing in land of only moderate fertility, thus accounts for the fact that many trees which are allowed to grow and bear at their own sweet will are seen to carry prodigious crops one season and to be shy bearers the season after.

Overbearing not only enfeebles the coming season's buds, but it also severely disturbs the constitution of most trees. More energy is spent by them in perfecting the embryo, which is the essential part of the plant's seed or kernel, than is required in elaborating the pulp, and as much, if not more, valuable mineral constituents are abstracted from the soil in order to produce the seed as it does to manufacture the flesh part of the crop. Thinning, therefore, by reducing the number of matured seeds, considerably lessens the drain on the vitality of the plant and of the soil. Thinning, some argue, is a costly operation, and necessitates in some cases the expenditure of 6d. to 2s. a tree in labour spent on that operation alone, and in some cases, when old and vigorous trees have to be carefully gone over, it may cost as much as 1s. to 3s. for so doing. It should be considered, on the other hand, that the fruit must be picked sooner or later, and that as far as actual cost goes, it does not matter whether this amount is spent before the seeds form or when the fruit is ripe and ready for market.

The extra cost of picking, therefore, need not be entertained, as it is practically the same, whether part of the crop is picked when thinning and part at the time the fruit ripens, or whether the whole crop is picked at the one time. But, apart from the consideration of more even crops in a succession of seasons, thinning also influences to a marked degree the season's crop. Although less in number, fruit from a thinned tree equals in weight, and certainly surpasses, as regards size and market value, fruit from a like tree left unthinned.

A few figures will demonstrate that the lesser number of fruit from a tree that has been thinned, equals or even surpasses in volume the crops from an overloaded tree that has not been thinned.

Two peaches measure respectively $1\frac{1}{2}$ inches and 3 inches in diameter ; some might imagine that the second is twice the size of the first, in reality it is eight times as voluminous, or in other words, it would take eight times the number of $1\frac{1}{2}$ inch fruit to fill a bushel case which would hold a given number of 3 inch peaches, for the cube of 1.5 is 3.375, whereas the cube of 3 is 27, or eight

times as much. In the same way, two apples measure 2 inches and 4 inches in diameter, the larger fruit is not twice as big as the first, but eight times larger, for the cube of 2 is only 8, whereas the cube of 4 is 64, or eight times more. By a similar reasoning it is easy to demonstrate that fruit 3 inches in diameter is more than double the size of fruit 2 inches in diameter. For convenience of calculation in multiplying and dividing let us reduce the inches to quarter inches, and it is thus found that the volume of a fruit 12 quarters in diameter is more than three times the size in cubic measurement of another fruit 8 quarters in diameter.

Thinning not only increases size, but also improves appearance. It thus pleases the consumer, sells easier, and is more profitable to the grower. Poor fruit, on the other hand, gluts the market, brings down prices, and often does not pay for handling.

The theory of thinning having now been minutely gone into, a few practical hints regarding the method, so far as the different varieties of fruit trees go, may be of value.

Hand labour, as in many other operations which require skill as well as judgment, is the only practical method at present. Apricots are the first fruit which come ready for thinning, and this may be commenced when the fruit is about the size of marbles, sometime towards the beginning of November; at that time the fruit has stopped dropping, and the seeds have not commenced to harden.

Apricots intended for canning or drying should not go more than 10 to the lb., and to attain that weight they must measure $1\frac{3}{4}$ inches in diameter, and should be thinned to about $2\frac{1}{2}$ inches apart on the branches where the trees are well loaded, and have not been thinned by frost or by beetles. Should they have dropped a great many fruit, and left them in bunches, the smaller fruit only, which would not develop, are rubbed off. Californian apricot growers consider that a healthy tree, having a body 3 inches in diameter, or a little over, should carry fifty pounds of fruit, and at 10 to the pound this would take 500 full size apricots to the tree. By counting the apricots on a few trees, the operator soon learns when sufficient thinning is done, though the tendency at first is to leave too much fruit. Other practical growers estimate that on a limb 4 ft. long, with three to five laterals, there are, under conditions of unrestricted growth, between 100 to 125 apricots. When properly thinned and cut back that limb should produce not more than one fourth of that number, or 20 to 24 apricots, but they are perfect in quality, superior in size, and classed as "extras." Apricots thus treated measure about $2\frac{1}{2}$ inches in diameter, the ordinary fruit of this class measures only $1\frac{1}{2}$ inches. In other words, the larger fruit is over three and a half times the size of the smaller one, and the one fourth thinned crop will occupy about three-fourths bulk space of the full unthinned crop.

Peaches and nectarines, next to apricots, require thinning, and according to the earliness or lateness of the variety, and of the locality, this operation should be done from the middle of November to the middle of December. They are generally thinned when about the size of a hazel nut, or a little larger, and a space of 4 to 6 inches should be left between each fruit. In Michigan and in Georgia where peach growing ranks as one of the leading industries, only two peaches are left on twigs $\frac{1}{4}$ inch in diameter, after the trees have been well pruned; three or four on twigs $\frac{3}{4}$ inch in diameter, and if the land is not irrigated and is not naturally moist, only half; thus the trees will bear a good crop every year, and will be long-lived. All thinning is carefully done by hand, and all double fruit is taken off. The fruit on the points of the branches should be much further apart than that along the limbs of the tree. Peaches (except the early flat China peach) when less than $1\frac{3}{4}$ inches in diameter, are not saleable, and by thinning their size are easily increased to $2\frac{1}{2}$ inches, or three times the size, they then bring much better prices.

Apples are thinned from the time they are of the size of a hazelnut until they are thrice as large. The ordinary rule in thinning them is after the tree is in good bearing only leave one apple to the spur or one, or at most two, where there were bunches of 3 to 10.

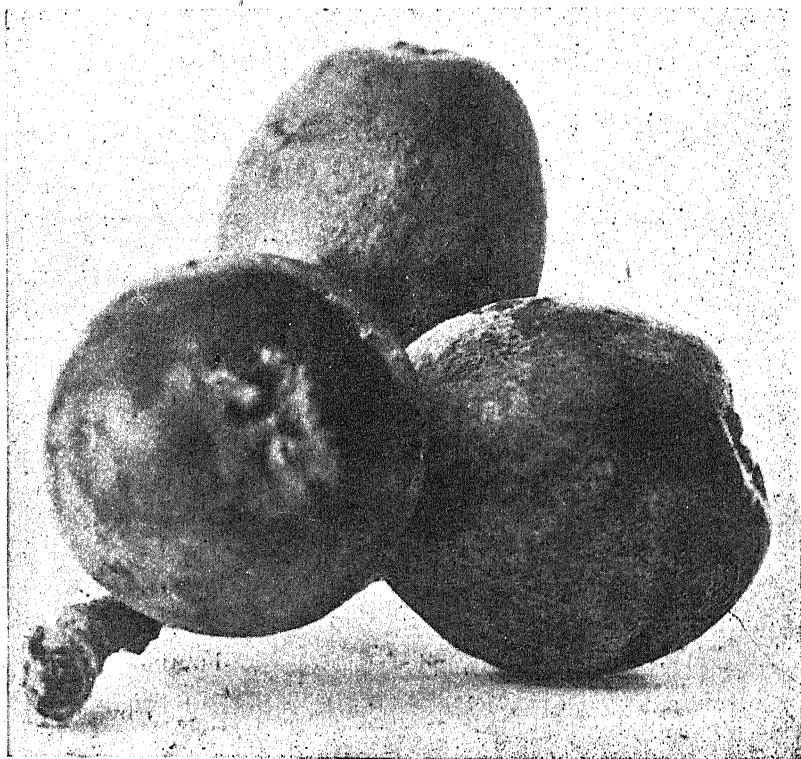
Prunes, it is the Californian experience, need thinning to give good fleshy fruit, especially when they show a tendency to overbear, when they only produce fruit that when dried is nothing but skin and seed.

Grapes in hothouses in the cooler climate of Europe are systematically thinned, and the careful grower, armed with a sharp pair of pointed scissors, snips off the tail end of the bunches, as well as the hanging wings or shoulders, and also all small and half-developed berries. By this means the bunch assumes the shape of a somewhat conical cylinder, and every berry grows to a larger and more uniform size. In this country, however, where labour is so dear and grapes so cheap, and where, above every other reason, the mass of the consumers will give little more for grapes of extra quality as they would for inferior fruit, it is questionable whether thinning grapes on a large scale and except for special purposes can be recommended as profitable. In my opinion, it would be better, under the conditions that obtain here, to regulate the crop by proper pruning in the winter time.

To conclude these notes on thinning fruit, it may be said that the grower who allows his trees to overbear, and the stock-owner alike who overstocks his run, both show an error of judgment; neither will attain the full measure of success which both might well reach but for following wrong methods:

LOQUATS.

The following report has been forwarded by Mr. A. Despeissis, the Viticultural and Horticultural Expert to the Department of Agriculture :—Mr. J. Hawter, of the Darling Nurseries, brought on Thursday, the 6th November, to the Department a box of Victory loquats, from a tree grown at his nursery at Smith's Mill. The variety is an Australian seedling of the highest order of merit. The trees, Mr. Hawter states, have a particularly vigorous and healthy growth, and begin fruiting quite early, generally the second year of planting. The fruits ripen towards the end of October and beginning of November; it is thus a mid-season loquat, but as regards size and appearance, one of the best in cultivation. The fruit is large, egg-shaped, two inches long and



Loquats—"Victory."

$1\frac{1}{2}$ inch broad; ten average fruit turned the scale at a pound. In size it may be compared to a good sample apricot. In colour it is yellow, tinted amber on the side exposed to the sun; the flesh is juicy, sugary, and pleasant in flavour. As a substitute for cherries, which, except in a few privileged localities,

have proved very disappointing to growers, I would strongly recommend the cultivation of these, as well as some of the other improved loquats. They come in at a time when the fruit market is practically bare, that is to say, after the winter citrus fruits have gone, and before the early summer fruits have ripened.

NOTES ON MT. BARKER AND DISTRICT.

BY OUR CORRESPONDENT.

The heavy timber in this district frightens a good many people from taking up land, but they should remember that they get a better rainfall and cooler climate and can grow crops which cannot be grown in the hotter and drier districts. I am sure that the land round Mount Barker will compare favourably with any for close settlement.

Stock, fruit, and potatoes are the chief things produced, and I feel certain that dairying could be successfully carried on with the aid of grasses and fodder plants; the most popular grass at present grown is cocksfoot, which is doing well.

The cost of clearing ground in the Jarrah and Red Gum country averages about £10 per acre, but by judicious ringing and attention in keeping down shoots and undergrowth by burning, stocking, etc., the cost can be brought down to £3.

The native dogs are a great curse in this part of the country, many of the settlers loosing heavily, and, to my mind, any assistance the Government give should vary in the different districts as the conditions are different. In the heavily timbered and scarcely populated districts the settlers have twice as much to contend against than those who live in a more open and populous district.

Fruit-growing is making great strides, and Mount Barker is already beginning to make a name for the excellent fruit it produces.

Apples and pears are the fruits most grown, and they seem to do the best. The favourite apple varieties are "Rokewood," "Yates," "Jonathan," "Kentucky Red Streak," and "Munroe's Favourite." Everywhere where the trees are bearing the growers appear satisfied with the returns, and tell me their orchard is the best paying part of the farm.

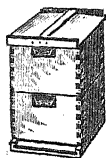
Mr. W. Souness has been able to build one of the best houses along the Great S. line, and tells me fruit went a long way to pay for it. Most people regard his orchard as a little gold mine.

Some of the returns from individual trees are very good. Mr. Andrew Muir has picked as much as a ton of fruit off one pear tree, and Mr. G. Warburton made over £10 off some of his apple trees, and sold the last of his fruit the other day at 57s. a case.

MODERN BEE HIVES.

J. SUTTON, DRAKESBROOK.

Having made reference to the easiest way of commencing bee-keeping, and presuming those interested have a few bees, a natural question arises—what hive is best to adopt? So much has been written by experts, in bee papers from time to time, that it may appear like presumption on my part to attempt to deal with a question of so much importance to the would-be apiarist. However, after all I have an opinion, and one I am not afraid to assert, viz., that the hive taking the Langstroth frame is in more general use the wide world over than any other make, and, seeing it can be adapted to meet the requirements of any locality, in my humble opinion it is the best and standard hive.



The dimensions are—inside measurements: length, $18\frac{1}{2}$ inches; depth, $9\frac{1}{2}$ inches; and any width, to take 8, 10, 12 or any number of frames, at the discretion of the apiarist. The 8-frame hive is handy, and for a starter all that may be desired; the end boards are rabbeted down $\frac{1}{16} \times \frac{7}{16}$ inch; on this is nailed a strip of folded tin, on which rests the frame, and leaving on the top side of frame a bee space of $\frac{1}{4}$ inch. Dimensions of frames are: top bar, $18\frac{3}{4}$ inches long; bottom pieces $17\frac{3}{4}$ inches long; ends, $8\frac{1}{2}$ inches, and of various widths. The one I would certainly recommend is the Root-Roffman Frame, which is so constructed that a bee space is always exactly the same when the frames are crowded together, as in the brood nest they always ought to be. In comparing these sizes you will find that the bottom of frames are within $\frac{1}{8}$ inch of the bottom of hive, and to get a bee space a $\frac{3}{8}$ -inch piece of strip $\frac{7}{8}$ inch wide is tacked on the bottom board.

The idea of cutting out a piece in front of hive, about 3 inches wide and $\frac{1}{2}$ inch deep, has long since been demonstrated as out of date. With the hive as given above everything is interchangeable; at any moment you can remove a frame from one to the other, or can take a super from one hive and place it on its neighbour, without any bother of fitting.

For extracted honey it is best to use a honey board, which is to keep the queen and all her young brood always in the bottom box or hive, placing a second body on top (this is called a super), and once your bees are strong and will fill the two bodies, they will commence to store honey in the super, which, when full, can be replaced with an empty one, while the one removed is being extracted. For section honey a half body or half super is used, in which the section boxes are fitted, and placed as above directly on top of the one in which your queen and young are working.

After all it is a matter of indifference to the bees as to what sort or size of hive you place them in, so long as the hive is strong, sound, and well fitted together; but the convenience in handling makes all the difference. Being interchangeable in all its parts

reduces, to a very large extent, the work of the apiarist when he has a hundred or more colonies to care for, and more especially when honey commences to come in in large quantities.

When handling honey, extracting, and getting ready for market, give me the "Dove-Tail-Langstroth" hive, and let me have it two or three stories high, so that the bees can fill the frames and cap it over before it is removed for extracting; then your honey may at once be strained and put into tins ready for market without fear of it going bad, as unripe honey certainly will, if tinned and sealed before maturing. Unripe honey will candy sooner than ripe honey during a cold spell in the weather.

Besides the hive referred to above there are others that have taken a good position in America, viz.: the "Heddon" hive, of the same dimensions, except the frames are about half the depth of the "Langstroth," and are close fitting at the ends; then the "Quinby" hive is nearly of the same inside measurements, only this has closed end frames, and lately, the "Danzen Baker," or "Danzy" hive, has been introduced, and is coming to the front. Each have some special points peculiar to themselves, none of which, to my mind, compare favourably with my choice—the "Root's Hive."

POULTRY NOTES.

In order to test the vitality of eggs imported for setting from the other colonies, Mr. A. Crawford, of the Department of Agriculture obtained four settings of Black Silver and Golden Spangled Hamburg eggs. These were shipped in one of the local steamers, and by the time they reached here some of the eggs were nearly three weeks old. The cost of freight, customs, wharfage and clearing charges was about one pound. The eggs were all set the day after arrival and only seven chicks came out; all of these died within the first two weeks, while other chickens hatched at the same time and in the same foster-mother, have done well and have had no deaths among them. I then got a setting sent by parcels post, but found, on arrival, that six eggs were broken and three cracked; the other three have been set, but they are either infertile or the knocking about they got has destroyed them, as they showed no signs of development. From these experiments I have concluded that it does not pay to import eggs for setting.

Mr. W. E. Cooke, of the Observatory, writes:—"Is not the following rather remarkable? On October 6 (evening) I put a setting of Minorca eggs under a broody hen. The eggs were quite new-laid. The hen sat for that night, and the following day and night, then went off. The eggs remained on the ground sheltered from

rain till the 12th, when, having another broody hen, I put them under her. On October 28th two chicks appeared; now there are six, and more coming."

Mr. A. Crawford says:—The eggs were probably in a warm place, and development had evidently commenced before the hen left the eggs, and then gone on until the next hen was put on them. I have known a case in the northern part of this colony where three hen-eggs were put under the eaves of a thatched cottage and forgotten, and later on three chickens came out.

COW PEAS AND SOY BEANS.

We have in these two leguminous plants, or family of plants, two crops that are of inestimable value to our farmers, and it seems strange that they should be so slow in taking them up (says a writer in the *Prairie Farmer*), and yet not more so than to see farmers sell clover for one dollar a load, just to get it out of their way, or haul manure and throw it in a gully or leave it under the eaves of the barn to wash away. The younger and more progressive farmers are looking to the building up of their lands, and consequently save all wastes, and use leguminous crops for the betterment of the soil. The clovers have been our best manuring crops, but in the intense farming which must be practised from this time on, we cannot depend on a crop so uncertain. It is next to impossible to get a perfect stand with dry weather coming just when the tender clover plant most needs moisture. Then it requires eighteen months to get the full benefit of the crop, while cow peas or soy beans require less than four months. For an orchard or very poor soil, and where the crop is to be pastured or used as a mulch, the cow pea is superior to the soy bean, but where seed or hay is desired, the soy bean is far ahead. The cow pea is also preferable for sowing in corn at the last ploughing. Some use from one to two bushels of seed per acre, but if drilled with a corn drill dropping one or two seeds every 18 in., one half-bushel will plant an acre, and on medium soil the vines will be thick enough.

There are over a hundred varieties of cow peas, the Whip-poor-will, Black, Clay Colored, and White, being the best. For best results the ground should be well prepared, and seed planted after the soil is warm enough to start growth immediately. Do not try to sow broadcast and harrow in, as the seed, being lighter than the soil, it will come to the top every harrowing. Drill with a two-horse wheat drill, leaving the rows about 4 ft. apart, or plant with a one-horse corn drill, putting seed 2 in. or 3 in. deep. If the crop is for fertilising, plough under in time to sow wheat or rye, for if left on the ground over winter it loses

two-thirds of its most valuable fertilising ingredient—nitrogen. One acre turned under will give the soil over 64 lb. of nitrogen, 20 lb. phosphoric acid, and 110 lb. of potash, of which from one-fifth to one-eighth is in the roots. It will be found a very difficult task to plough the crop under without first cutting with a disc harrow three or four times, and some soils can be put in good condition for wheat in this way. No successful way to harvest seed has been found, so the pods must be picked by hand as soon as ripe. Handling for hay will also be found as hard as the hardest work, as one trial will convince anyone.

Summing up, the cow pea is a great acquisition to the farmer for sowing in orchard, corn, or when pasture is desired, but for soiling or hay the soy bean is preferable. Of varieties of this we have the Dwarf or early, Medium, and Mammoth or late. The Dwarf has been known to yield 100 bushels of seed per acre, and several tons of hay, superior to clover in feeding value, while the seed is three times as rich in protein, and four times as rich in fat, as corn. All kinds of stock relish them. For dairy cows they are superb; for pigs and sows in pig there is nothing better, while horses prefer the hay to any other, and the oily bean gives them a sleek, glossy coat of hair. Being of a bunch habit, growing from 18 in. to 3 ft. and 4 ft. tall, they are as easy to harvest as hay or grain. They will stand more frost than cow peas and also more severe drought or excessive moisture. In fertilising value they are ahead of cow peas. The Dwarf will be ready to feed in two months, and ripe in less than three. A crop can be grown after wheat is cut in time for another crop of wheat to be sown, and over 30 dollars (£6) worth of fertiliser to the acre will be added to the soil. Surely farmers are missing two good things when they fail to have cow peas and soy beans in their rotation.

A bulletin of the United States Department of Agriculture says:—The cow pea is to the Southern States what alfalfa is to the West, and red clover to the North—a forage plant well adapted to the need of the region. It has been cultivated in the South for at least 150 years. There are a great many varieties of the cow pea, also a great variation in the length of time required to ripen seed, some requiring eight or nine months, and a few in sixty days from the time of planting. Whenever a crop of cow peas has been taken off a field the surface soil is left richer, by a good many pounds, in that most costly of all plant foods, nitrogen. Cow peas are planted broadcast or in drills, very commonly between rows of corn after the crop has been laid by. The amount of seed used is from four quarts to two bushels per acre, the average amount being perhaps about three pecks. If sown in drills 18 in. or 30 in. apart less seed is required than when sown broadcast. The seed will stand being covered to a depth of 2 in. or 3 in., but care must be taken to plant when the ground is neither too wet nor too cold, as the peas rot very rapidly under such circumstances. Much of the failure that has attended the attempted introduction of cow peas

into the Northern States is due to planting before the ground is warm enough; they are more susceptible to cold and wet than is corn. When the vines are grown for hay the yield will be larger if the seed is planted in drills and cultivated once or twice. The yield of peas is also larger when only a moderate amount of seed is sown, and the vines have more space, with plenty of light and air between them. The vines should be mowed for hay when the peas are well formed and the leaves and pods are first beginning to turn yellow. After wilting on the ground or in windrows from twenty-four to forty-eight hours the hay is placed in small piles or cocks and allowed to cure for several days, when it is taken to the barn or stacked in sheds. The hay-making process is a difficult one, requiring more care and attention than in the case of red clover, because the broad leaves and thick stems contain a larger amount of water. The hay must be placed in cocks before the leaves become brittle, and the piles must be small enough to allow free circulation of air to the centre of each. The feeding value of cow pea hay is very high, as shown by chemical tests and analysis. One ton of it is equal to a ton and a half of best Timothy.

LICE ON ANIMALS.

EFFECTIVE REMEDIES FOR GETTING RID OF THEM.

Kansas Experiment Station: These wingless insects are found parasitic on all animals. Cattle are unfortunate in being the most common victims of lousiness. Sheep are rarely affected. We meet with this disease most frequently during the winter months, in neglected, half-starved, dirty animals. Young animals are especially liable to be infected. Sometimes, however, even well-kept cattle suffer severely.

So-called lice are either true lice (*Haematopinus*) or bird lice (*Trichodectes*). The former have a slender, often spindle-shaped body, a pointed head, greyish-blue color, and suck blood. The *Trichodectes* are broader, have a squarish head, brown color and have biting mouth parts, living on hair and epidermal scales. *Trichodectes* are usually found on neglected, unthrifty animals, with long, shaggy hair and a dirty, scaly skin. They usually disappear as soon as the animal's condition improves. True lice, on the other hand, occur also on thrifty animals.

Every species of domestic animal has its own specific louse, or lice (horse louse, ox lice (two kinds), pig louse, goat louse, dog louse, etc., and *Trichodectes* of the horse, ox, sheep and dog). The louse of one species of animal cannot exist permanently on another species.

Symptoms—Lice always give rise to a troublesome itching, causing the animals to rub and scratch the infested portions of the

body. The hair is rubbed off, or drops out, the exposed skin becomes inflamed, scaly and even covered with extensive eruptions and large, raw, bleeding surfaces, giving the animals an extremely distressful and unsightly appearance.

Lice seem to prefer the region of the neck and mane, the back, root of tail, and, in cattle, the base of the horns, in pigs the region between the hind legs.

The presence of lice and their nits attached to the hair is sufficient evidence regarding the nature of the trouble.

There are many remedies for destroying lice, e.g., arsenic, mercurial ointment, hellebore, tobacco decoctions, the seeds of *Delphinium staphysagria* (stavesacre), areolin, carbolic acid, lysol, train or fish oil, etc.

The following are of especial merit:—

First—Mercurial ointment diluted with a little oil is very effective on horses and pigs. It is applied in small quantities to the affected parts only. It must not be used on cattle.

Second—A tobacco decoction (one pound tobacco and three gallons boiling water, allow to stand for half an hour) with or without the addition of two pints of vinegar, is very effective, but often produces nausea in horses and cattle.

Third—Five per cent. solutions (three teaspoonfuls to a pint) of creolin or lysol in water containing 20 per cent. of alcohol, well rubbed in with a stiff brush, is very effective.

Fourth—The remedy which has given the most satisfactory result to the writer is kerosene emulsion, made as follows: Kerosene, two gallons; common or whale-oil soap, one-quarter pound; water, one gallon. Heat the solution of soap and add it boiling hot* to the kerosene; then churn the mixture for ten minutes. Dilute the emulsion with twenty gallons of water and apply with a spray pump. If no spray pump is at hand, drive the animals, if many are to be treated, into a narrow chute, and apply the emulsion with a common watering can, being careful to treat all parts of the body.

Select a mild, sunshiny day for the operation. In the course of four days or a week repeat the application in order to destroy those lice that have in the meantime emerged from the nits. Where the animals have been kept in stables or pens do not neglect to give these places the same treatment; they are just as lousy as the animals, and if not treated they will soon reinfect the animals. Finally, avoid conditions favorable to future infections, by giving animals proper care and keeping them in a vigorous, thrifty condition. For long-haired animals (calves), shearing might be recommended. Weak, run-down animals may require special nursing to recover completely from an attack of lousiness.

*Note—Be sure to have the water boiling hot when you add it to the kerosene, and churn it thoroughly, otherwise you will have trouble in making a good emulsion, which, when made right, should have a creamy appearance.

CROPS TO SOW IN DECEMBER.

BY PERCY G. WICKEN.

The weather is now becoming warm and the green look is beginning to go off the paddocks, to be replaced by a dry brown appearance. The only hope to keep things growing in the dry parts is to be continually stirring the soil, not too deep to interfere with the roots, but just sufficient to keep the soil from becoming caked, and thereby allowing the moisture to evaporate. Every particle of moisture requires to be kept in the soil at this time of the year. Weeds are easily got rid of if hoed up during this weather. Low-lying and damp ground, which has been wet during the winter, may be made to grow a crop, if properly worked up. Where water can be obtained irrigation should be carried out wherever possible, and to those who are irrigating on a small scale, it should be borne in mind that one good irrigating is worth half a dozen small waterings; the ground requires a soaking, and then to be worked up and left until time to irrigate again. Light watering only encourages surface roots to grow, which causes the plant to droop down directly the weather becomes hot; we want to encourage the roots to go down deep if the plants are to do well during the hot dry weather. Seed beds planted this month will require to be shaded, and this can be done by using some tea-tree bushes, cheap hessian, or old bagging stretched across a frame.

FRENCH BEANS. This plant will now be in full bearing. The Scarlet Runner and other climbers will be climbing up well, and are useful for shade purposes. The Snake Bean can also be trained up; it is a good climber. Butter Beans make a change on the ordinary French Bean, and are a good variety to grow. As soon as the plants cease bearing dig up the ground and plant something else. Plant plenty of these beans so long as the ground is moist.

MADAGASCAR BEANS. In addition to being a good vegetable these plants are a splendid climber, and a handsome plant, they may be trained over verandahs or out-houses. A few more may be sown.

LIMA BEANS. Either dwarf or the runner variety may be sown if the ground is fairly moist, any quantity of these may be sown, as the seeds are just as good dried and kept until the winter as when fresh. The Black Pole Lima is the best climber, and I think, the hardiest, but is not quite so well flavored as the white varieties.

CABBAGES (Cauliflower). Plant out a few plants, and towards the end of the month make seed beds to produce a good number of plants. Put out strong healthy plants and shade when transplanting, they require plenty of good manure to keep them growing well, and help them to overcome the attacks of aphids, etc. The grubs and moth are very troublesome at the present time, and

the spray pump should be kept going. Paris Green 1 lb. to 250 gallons of water is the best spray to use.

CUCUMBER. If the ground is sufficiently moist and you wish to keep up a supply, plant out a few holes.

CELERY. A few plants may be sown, but unless a good supply of water can be obtained it is very little use to plant.

MELONS (Rock, Water and Preserving). Sow a few more hills for late crops, pinch back any shoots that are running too far; hoe the weeds and loosen up the earth on the hills and cultivate between the rows by the best means available; a light plough is the best.

MAIZE (Sugar or Sweet). This is a vegetable that deserves to be grown more largely than it is; it is better for table purposes than the ordinary maize. More rows may be sown this month and those growing must be kept well cultivated.

PUMPKIN. The same remarks as for melons apply to this crop. Bugle or Rio pumpkins can still be sown for a late crop, and if the ground is fairly moist will succeed well.

SWEET POTATOES. A few more cuttings may be planted out, but will require shading; those growing will most likely require weeding and to be further hilled up and the land between the rows cultivated.

TOMATO. Those growing will require to be staked, and any plants in hand may still be put out.

TURNIPS. A number of varieties of turnips may be put out, and those intending to make a collection of turnips at our National Show next March must plant before the end of the month. Give them plenty of room to develop; plant 36 inches apart and thin out when well up to 16 inches apart in the rows.

FARM. Farmers during this month will be so busy harvesting that it is of very little use to advise what should be sown. When building hay or grain stacks, always plough a land on each side of the stack about a chain away from it; this will often save the stack from fire. It is a mistake to make stacks too large or to place too close together; the liability of loss by fire is too great. For those who have time to plant, maize and sorghum may still be sown, both for green feed and grain. Wherever possible, a crop of Cow-peas, Soy-beans and some leguminous crop should be sown; all kinds of stock will eat them, and if not required for use green it can be made into hay or threshed and the grain used for cattle or pigs during the winter. If not required for cattle feed it may be ploughed-in green, and has a wonderful effect on the next crop. If we could only persuade farmers to sow a few acres of this plant after their early wheat is off and plough it in during the winter it would make a great difference in the yield of wheat and a saving in the manure bill; it is the cheapest means by which nitrogen can be supplied to the soil.

ANSWERS TO CORRESPONDENTS.

Mr. E. W. Geyer, Marble Bar, writes asking for information with regard to the properties of the castor oil plant, this matter was referred to the Government Botanist, who replies:—"The properties of castor oil are contained to some extent in the leaves of the plant, as well as in the seeds, from which the castor oil of commerce is derived. The leaves are used in the form of poultices to regulate the flow of milk from the breasts, and they are said to be also emmenagogue, so that it is possible that if pregnant cows ate them, premature dropping of their calves might result. The plant may become a nuisance by spreading over ground wanted for other purposes, but as it thrives even in desert country, it might be worth while encouraging it to grow in some districts for the sake of the oil obtained from the seeds, which has a great many other uses than as a purgative. The seeds, in their natural state, if eaten by man or beast, produce violent purging that may be dangerous to the life of either, so that for that reason the plant should not be allowed to grow where stock graze if the animals eat the seeds or leaves."

Mr. T. H. Saw, Albany, writes forwarding sample of grass for identification; this was submitted to the Government Botanist, who replies:—"The grass is the 'Darnel' (*Lolium semulentum*), closely allied to and resembling common Rye Grass (*Lolium perenne*). It is without awns like some varieties of the rye grass, though 'Darnel' is also generally provided with awns. It has the reputation of being poisonous, its seed, when ground up with the wheat among which the grass generally grows, producing headache, drowsiness, vertigo, etc., but some deny this property. 'Darnel' is a native of southern and central Europe and Asia, but has been naturalised in Great Britain, and is found also in this and other colonies. It is supposed to be the tares of scripture."

Mr. C. Wilson, Northam, writes asking for information as to sheep suffering from blindness. This matter was referred to the Stock Department, who report thereon as follows:—"Mr. Wilson's sheep are evidently suffering from Ophthalmia. They should be bled from the little vein just below the eye, and the affected eyes bathed with a lotion, two or three times a day, composed as follows:—Sulphate of zinc, 20 grains; tincture of opium, 1 oz.; water, 1 pint. It is a good plan, should the inflammation be very great, to place the sheep in a dark loosebox and give, internally, two ounces of Epsom salts in half a pint of water every second day. As a preventive the free use of rock salt is strongly recommended."

Mr. C. W. Sims, Walkaway, writes asking for information re the action of phosphate manures, and whether they exhaust the soil. This was submitted to Mr. P. Wicken, who replies:—"Phosphatic manure will not exhaust the soil, except that it will, for a time, give an increased crop, but as it only supplies one ingredient—Phosphoric Acid—to the crop, and as the plant requires supplies of nitrogen, potash, and lime, the plants will, after a time, refuse to grow for want of these other ingredients. If the phosphate is mixed in judicious quantities with manures containing nitrogen (as sulphate of ammonia, blood manure, or nitrate of soda), or potash (as kainit or sulphate of potash), the soil will improve year by year owing to their use."

Mr. G. W. Hester, Bridgetown, writes enclosing some grubs which have been collected from his apple trees. These were submitted to Mr. Despeissis, the V. and H. Expert, who reports thereon as follows:—" *Heliothis armigera*, a widely distributed pest, best known in America as Bollworm, on account of the injury it does to balls of cotton. Attacks fruit trees, tomatoes, etc., and also very fond of the buds of carnations. Spray with kerosene emulsion or with Quibell's liquid disinfectant at the rate of six teaspoonfuls ($\frac{3}{4}$ oz.) to one gallon of water, to ten gallons of this add one ounce of Paris Green or a handful of lime to prevent burning. This pest seems to show in swarms every two or three years, when it does great damage, especially in orchards or vineyards which have been overrun with weeds during the early spring. Should they appear in great abundance try to rid the trees of them either by hand picking, if the trees are small, or by poisoning, as above, if the trees are large. Then tie round the trunk a strip of sheepskin with the wool outside and smeared with tar or some preparation over which they will not crawl in their ascent from the ground to the top of the tree."

MARKET REPORT.

FOR MONTH ENDING DECEMBER 13TH.

The West Australian General Produce Company report sales effected for the following articles on account of various consignees, for the four weeks ending December 13, 1900:—Business during the past four weeks has been very active, and every indication of continuing, owing mainly to the approaching holidays. Bacon—All sound lots submitted sold readily and at satisfactory prices; orders for delivery within the next ten days have been heavy. Hams—A large consignment of English and Hutton's Pine Apple brand just arrived and now ready for delivery; sales up to the present very satisfactory. Butter—Values so far unaltered, but rise expected daily. Lard and pastry butter selling well. Cheese—A slight rise has taken place f.o.b. Melbourne, and the general opinion is that a further rise is imminent. Eggs—Local not over plentiful, with demand good; imported are practically supplying the market. Potatoes—Local consignments not plentiful; enquiries numerous for good sound lots; imported are now arriving in rather bad condition, requiring to be picked over. Onions very scarce; a consignment new season's Victorians expected to arrive beginning of next week. Chaff rather dull of sale, several lots arriving in heated condition. Bran and pollard selling well. Flour not very active. Oats unaltered. Wheat—New season's now offered at up-country stations; prices and values likely to ease a little. Fruit—A better assortment arriving daily; supplies increasing; good values obtained for all early summer varieties. Vegetables very hard to dispose of. Poultry in splendid demand, such as fowls, ducks, geese, turkeys, etc., and it would be advisable for holders of same to lose no time in sending in consignments, as otherwise opportunities for goldfields requirements will be lost and prices weaken. Farm and Dairy Produce:—Bacon—Prime sides, 10d to 11d lb; hams, Hutton's, 1s 1½d to 1s 2d; English, 1s 1d; others, 1s lb. Butter—Factory, 1s 1d to 1s 1½ lb. Lard—In tins of 11b, 9s 6d doz. Cheese—Loaf, case lots, 9½d to 9½d lb; medium, case lots, 9d to 9½ lb. Eggs—Local, 1s 4d to 1s 6d; imported, cask lots, 1s 1d doz. Potatoes—Local, £10 10s ton; imported, £7 10s ton. Onions—16s per cwt. Chaff—worth £4 5s to £5 10s ton. Hay—Oaten, £4 10s ton. Straw—£3 5s ton. Bran—£6 10s to £7 ton. Pollard—£6 15s to £7 10s ton. Flour—Local, sacks, £9 to £9 5s; quarters, £9 5s to £9 10s ton. Oats—N.Z., 3s 3d to 3s 6d bushel. Maize—Whole, 5s 6d. Fruit—Loquats—worth 3d to 4d lb. Cherries—worth 22s 6d to 24s case. Bananas—worth 25s to 30s case. Figs—worth 1s doz; value declining. Apricots—16s to 24s case. Cape Gooseberries—worth 3d to 4d lb. Strawberries—worth 10s to 15s doz 11b pannets. Plums—Cherry, worth 7s 6d to 8s quarter case; black, worth 8s 6d quarter case. Gooseberries—Green, 5s quarter case. Vegetables.—Cabbage—2s to 3s 6d cwt. Carrots—1s 6d doz bunches. Parsnips—2s doz bunches. Turnips—White, 1s 6d doz bunches, 5s cwt. Beans—French, 1½d to 2d lb. Peas—½d to 1d lb, plentiful. Marrows—3s 6d doz. Rhubarb—2d to 4d lb. Capsicums—1s lb. Salads and Herbs.—Lettuce—worth 8d to 1s doz. Spring Onions—worth 1s doz bunches. Beetroot—worth 1s 6d doz bunches. Cucumber—worth 6d to 1s doz. Tomatoes—worth 3s to 5s case. Celery—worth 1s 6d doz bunches. Cress—

worth 6d doz bunches. Thyme, Marjorum, Sage—Off stalk, 9d per lb. Mint—Off stalk, 6d lb. Poultry.—Fowls—Table, young and fat, 6s 6d pair; others from 5s pair; chickens, 3s 6d to 4s pair. Ducks—6s to 7s 6d pair; ducklings, 5s 6d pair. Geese—14s pair. Turkeys—Gobblers, 25s to 30s pair; hens, 20s to 22s 6d pair. Carcase Meat.—Pork—40lb to 50lb, 6d lb; sucking pigs, 5s to 7s 6d. Sundries.—Bonedust, £7 to £7 10s ton; phosphate, £4 10s ton; superphosphate, £6 10s ton; guano, ammonical, £6 10s ton; guano, phosphatic, £3 to £4 ton; coarse bacon salt, £3 ton; new corn sacks, 7s 6d doz; second-hand, 4s 6d doz; new bran bags, 4s 7d doz; second-hand, 3s 6d doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING NOVEMBER, 1900.

The weather has been, on the whole, of the kind usually experienced in November. With the approach of summer, the region of highest barometers moves down below our south coast line, carrying with it the track of the winter type of storms which usually affect only the S.W. and S. coastal districts at this time of year. To take their place an occasional tropical "low" stretches down from the N.W. coast towards the Goldfields, and sometimes passes right through to the Bight, usually bringing very sultry weather and thunderstorms. The showers accompanying these have been fairly heavy in places, filling tanks and dams.

The temperature has made a considerable advance, as might be expected, when compared with that for October, the increase in the mean maximum ranging from 6° to 10° in the Eastern districts. The effects of the sea in modifying the climate is always very noticeable in the summer months. The nights are, however, at present rather in favour of the inland districts. Thus, taking the mean maximum and minimum temperatures in a fairly straight line from Rottnest, eastwards, we find:—

			Max.		Min.
Rottnest	...	...	71·9	...	60·3
Fremantle	...	...	72·0	...	59·2
Perth Observatory	...	...	77·2	...	58·4
Perth Gardens	...	...	80·8	...	58·7
York	...	...	85·6	...	53·5
Southern Cross	...	...	88·9	...	57·5
Coolgardie	...	...	87·8	...	58·5

The climate of the south coast was, as usual, delightfully cool. Albany experienced one hot day, when the thermometer reached 91°, but the highest recorded at the Leeuwin was only 73·8.

THE CLIMATE OF WESTERN AUSTRALIA.

DURING NOVEMBER, 1900.

FROM TELEGRAPHIC REPORTS.

LOCALITY:	Barometer (corrected and reduced to Sea Level).		Temperature.			Rainfall.	
	High- est.	Lowest.	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	29.972	29.687	90.1	106.2	70.6	347	1659
Derby	30.074	800	90.3	112.5	72.8	34	1441
Broome	29.960	709	85.8	104.8	72.8	nil	1810
Condon	30.005	708	88.4	112.0	63.8	nil	1892
Cossack	068	729	84.5	109.2	64.5	nil	4003
Onslow	012	729	77.1	105.5	58.0	nil	2696
Carnarvon	060	792	73.2	107.0	56.5	6	1475
Hamelin Pool	112	787	74.7	102.4	49.2	14	820
Geraldton	157	794	67.8	102.0	51.1	30	2100
Hall's Creek	028	690	90.0	107.6	64.8	243	1709
Nullagine	115	645	86.0	109.0	59.0	14	1564
Peak Hill	142	703	81.6	106.0	55.0	29	2495
Lake Way							
Cue	183	651	79.5	106.8	52.2	21	1962
Yalgoo	164	702	75.9	105.8	47.0	2	1196
Lawlers	274	669	79.9	103.3	53.4	124	1521
Laverton	297	549	76.6	102.2	50.0	63	1543
Menzies	290	525	75.9	103.0	51.2	146	1212
Kalgoorlie	346	533	73.9	103.4	49.4	76	1095
Coolgardie	330	575	73.2	105.4	49.2	100	1055
Southern Cross	282	560	73.2	101.0	46.1	40	1102
York	207	636	69.6	102.0	44.0	36	2054
Perth Gardens	311	663	69.8	97.4	48.0	33	3569
Perth Observatory	303	664	67.8	96.0	47.8	40	3609
Fremantle	286	649	65.6	94.4	48.8	28	2721
Rottneest	241	563	66.1	92.8	53.4	22	2551
Bunbury	222	670	65.4	90.2	43.5	52	3645
Karridale	345	533	61.4	91.5	43.2	90	5123
Cape Leeuwin	344	423	63.2	73.8	52.1	86	4097
Katanning	315	573	64.4	94.8	43.0	8	2009
Albany	386	550	61.2	91.0	42.8	28	3664
Breaksea Island	406	469	61.0	88.0	48.2	35	2651
Esperance	411	513	64.8	99.0	43.6	15	2629
Balladonia							
Eyre	401	516	66.3	106.5	36.7	105	1652

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

**RAINFALL for Oct., 1900 (completed as far as possible),
and for Nov., 1900 (principally from Telegraphic Reports).**

STATIONS.	OCTOBER.		Nov.		STATIONS.	OCTOBER.		Nov.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	58	..	347	..	Millstream ..	..	..	..	..
6-Mile ..	102	1	..	..	Hong Kong ..	Nil	..	..	..
Carlton ..	188	4	..	..	Mallina ..	Nil	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	Nil	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	..	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	Nil	..	..	..
Turkey Creek ..	75	4	97	6	Balla Balla ..	Nil	..	Nil	..
Ord River ..	30	..	..	..	Roebourne ..	Nil	..	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	Nil	..	243	..	Fortescue ..	Nil	..	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	Nil	..	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	Nil	..	..	..
Denison Downs..	9	..	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY:					Chinginarra ..	Nil	..	..	..
Obagama ..	..	..	..	..	Onslow ..	Nil	..	Nil	..
Derby ..	Nil	..	34	..	Peedamullah ..	Nil	..	..	..
Yeeda ..	Nil	..	46	..	Clifton Downs ..	Nil	..	..	..
Liveringa ..	..	..	..	..	Red Hill ..	Nil	..	..	..
Mt. Anderson ..	6	1	..	..	Nanutarra ..	..	..	..	..
Leopold Downs ..	..	..	..	..	Yanrey ..	Nil	..	..	..
Fitzroy Crossing ..	24	3	57	2	Point Cloates ..	Nil	..	..	..
Quanbun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	Nil	..	Nil	..
Broome ..	Nil	..	Nil	..	Towara ..	..	..	..	..
Thangoo ..	..	..	..	..	Ullawarra ..	Nil	..	..	..
La Grange Bay..	3	1	1	1	Woorkadjia ..	Nil	..	..	..
NORTH-WEST:					Minnie Creek ..	..	..	..	..
Wallal ..	Nil	..	Nil	..	Yanyearddy ..	Nil	..	..	..
Condon ..	Nil	..	Nil	..	Williambury ..	Nil	..	..	..
DeGrey River ..	..	..	..	..	Boolathana ..	..	..	..	..
Port Hedland ..	Nil	..	Nil	..	Carnarvon ..	3	..	6	..
Boodarie ..	Nil	..	..	..	Cooralya ..	..	..	..	..
Yule River ..	..	..	..	..	Doorawarrah ..	..	..	..	..
Warralong ..	Nil	..	..	..	Mungarra ..	Nil	..	..	..
Muccan ..	..	..	..	..	Errivilla ..	..	..	..	..
Mulgie ..	..	..	..	..	Dirk Hartog Is. ..	123	6	..	..
Eel Creek ..	Nil	..	..	..	Sharks Bay ..	45	2	2	1
Coongon ..	..	..	..	..	Kararang ..	75	4	..	..
Warrawagine ..	Nil	..	..	..	Meedo ..	3	1	..	..
Bamboo Creek ..	Nil	..	9	..	Tamala ..	56	5	..	..
Marble Bar ..	Nil	..	223	1	Wooramel ..	20	3	Nil	..
Warrawoona ..	Nil	..	15	2	Hamelin Pool ..	7	3	14	2
Corunna Downs ..	2	1	..	..	Mt. Gould ..	5	2	..	..
Nullagine ..	Nil	..	14	..	Peak Hill ..	8	..	29	..
Tambourah ..	Nil	..	Nil	..	Abbotts ..	6	2	31	2
Mulga Downs ..	Nil	..	..	..	Belele ..	Nil	..	..	..
Mt. Florence ..	Nil	..	..	..	Manfred ..	Nil	..	..	..
					Woogarang ..	Nil	..	..	..

RAINFALL.—Continued.

STATIONS.	OCTOBER.		Nov.		STATIONS.	OCTOBER.		Nov.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					S.W. Div.—Cont.				
Wooleane ..	Nil	..	..	..	Belvoir ..	234	9	23	2
Dairy Creek ..	Nil	..	..	..	Mundaring Weir ..	309	13	101	5
Mt. Wittenoom ..	4	1	..	..	Guildford ..	281	13	37	2
Nannine ..	Nil	..	27	..	Canning Timber				
Star of the East	Nil	..	3	1	Mills ..	372	15	83	3
Annean ..	..	..	..	..	Kalbyamba ..	255	15	42	3
Tuckanarra ..	Nil	..	5	1	Canning Water-				
Cue ..	Nil	..	21	1	works ..	345	13	8	3
Day Dawn ..	Nil	..	2	1	Perth Gardens ..	271	15	38	3
Lake Austin ..	Nil	..	10	3	Observatory ..	264	14	40	3
Lennonville ..	9	1	24	2	Subiaco ..	285	14	24	2
Mt. Magnet ..	1	1	8	1	Claremont ..	309	12	11	1
Challa ..	Nil	..	..	..	(Richardson)	270	9	..	..
Youeragabbie ..	Nil	..	..	..	Fremantle ..	199	12	28	..
Murrum ..	Nil	..	..	..	Rottneet ..	123	9	22	..
Yalgoo ..	11	4	2	1	Rockingham ..	223	9	24	2
Gabyon ..	Nil	..	5	1	Jarrahdale ..	283	13	96	3
Gullewa ..	65	7	11	3	Mandurah ..	239	14	24	1
					Pinjarrah ..	242	10	88	4
					Harvey ..	288	12	48	5
SOUTH-WEST DIVI-					SOUTH-WEST, CEN-				
SION (N'N PART):					TRAL PART (IN-				
Murchison House	48	8	..	..	LAND):				
Mt. View ..	34	3	..	..	Momberkine ..	147	8	9	1
Yuin ..	20	2	Nil	..	Culham ..	172	12	12	2
Northampton ..	69	6	47	2	Newcastle ..	174	10	33	3
Mt. Erin ..	71	9	..	..	Eumalga ..	182	9	..	..
Oakabella ..	89	6	..	..	Northam ..	80	11	7	1
Tibradden ..	86	13	..	..	Grass Valley ..	..	..	7	1
Sand Springs ..	69	10	35	2	Meckering ..	164	8	5	1
Mullewa ..	26	4	21	..	Doongin ..	92	7	..	..
Bootenal ..	35	5	..	..	Whitehaven ..	86	6	..	..
Geraldton ..	31	10	30	..	Sunset Hill ..	87	6	69	3
Greenough ..	16	4	34	4	Cobham ..	139	11	..	..
Dongara ..	42	10	76	3	York ..	127	..	36	..
Dongara (Pearse)	38	6	73	3	Beverley ..	133	9	30	4
Strawberry ..	66	7	23	2	Barrington ..	78	7	54	3
Minginew ..	52	8	21	3	Sunning Hill ..	60	7	15	1
Rothsay ..	12	3	..	..	Wandering ..	216	14	26	3
Field's Find ..	10	2	Nil	..	Pingelly ..	83	8	10	2
Carnamah ..	38	6	46	4	Marradong ..	207	9	33	3
Watheroo ..	28	4	12	1	Bannister ..	181	8	32	2
Dandaragan ..	88	11	36	4	Narrogin ..	83	9	12	3
Moora ..	32	6	17	3	Wickepin ..	80	8	13	1
Yatheroo ..	139	11	47	5					
Walebing ..	42	9	25	3	SOUTH-WEST DIVI-				
New Norcia ..	101	13	18	5	SION (S'N PART):				
					Bunbury ..	219	14	52	..
SOUTH-WEST DIVI-					Collie Saw Mills ..	258	15	53	5
SION, CENTRAL					Glen Mervyn ..	209	14	191	6
(COASTAL):					Dardanup ..	182	14	78	3
Gingin ..	199	11	34	3					

RAINFALL.—Continued.

STATIONS.	OCTOBER.		NOVEMBER.		STATIONS.	OCTOBER.		NOVEMBER.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Boyanup	205	11	80	2	—Continued.				
Preston	201	13	65	5	Mt. Leonora	Nil	..	87	5
Busselton	111	16	57	5	Mt. Malcolm	Nil	..	105	6
Quindalup	157	10	48	3	Mt. Morgan	5	1	97	6
Margaret River	231	9	52	3	Laverton	6	1	63	..
Lower Blackwood	232	10	51	5	Murrin Murrin	1	1	88	6
Karridale	308	19	90	8	Pendennie	Nil	..	73	8
Augusta	..	..	55	8	Tampa	Nil	..	52	4
Cape Leeuwin	233	20	86	12	Niagara	7	1	90	7
The Warren	344	12	103	9	Yerilla	7	1	72	7
Lake Muir	318	15	58	7	Edjudina	..	..	..	..
Mordalup	255	17	34	10	Menzies	15	2	146	..
Deeside	213	15	53	8	Goongarrie	19	2	138	5
Riverside	270	19	85	9	Kurawa	42	2	65	..
Balbarup	288	14	20	1	Dixie Mine	50	5	151	6
Wilgerup	191	14	77	7	Kurnalpi	39	3	107	3
Mandalup	238	8	59	3	Bulong	44	4	53	6
Bridgetown	209	18	48	6	Kanowna	43	2	52	4
Greenbushes	223	16	69	5	Kalgoorlie	54	3	76	6
Williams	170	7	94	4	Coolgardie	55	5	100	6
Arthur	201	11	15	2	Burbanks	58	5	..	..
Darkan	207	8	..	..	Londonderry	63	5	75	5
Wagin	146	12	6	1	Woolubar	78	6	87	9
Glencove	258	10	15	1	Widgiemooltha	53	4	114	5
Dyiliabing	191	8	6	1	Norseman	81	8	175	5
Katanning	335	12	8	..	Bulla Bulling	79	4	..	..
Kojonup	256	10	21	2	Woolgangie	54	6	54	4
Broomehill	232	8	5	1	Boorabbin	62	8	239	6
Sunnyside	270	14	7	2	Karalée	78	6	..	..
Woodyarrup	295	12	10	3	Yellowdine	55	5	24	3
Cranbrook	262	13	14	3	Southern Cross	171	7	..	..
Blackwattle	278	12	..	..	Mount Jackson	98	4	47	3
Mt. Barker	336	14	33	6	Kellerberrin	77	7	23	3
St. Werburgh's	316	14	..	..	Mangowine	38	4	93	2
Forest Hill	376	18	95	13	EUCLA DIVISION:				
Denmark	331	14	59	..	Coconarup	141	13	..	..
Albany	364	18	28	11	Fanny's Cove	228	10	..	..
Point King	313	15	48	7	Park Farm	164	14	..	..
Breaksea	244	21	35	9	Esperance	165	13	15	..
Cape Riche	226	10	134	4	Gibson's Soak	139	7	27	2
Pallinup	309	11	135	4	30-Mile Condenser	132	13	..	..
Bremer Bay	225	8	11	2	Swan Lagoon	157	13	..	..
Jarramongup	212	13	..	..	Grass Patch	109	13	..	..
EASTERN DIVISION:					Lynburn	..	..	..	..
Lake Way	4	1	31	..	Israelite Bay	161	7	19	2
Mt. Sir Samuel	..	..	93	..	Balladonia	174	5	105	3
Lawlers	2	2	151	16	Eyre	..	11	105	..
Diorite King	2	1	124	10	Eucla	25	2	43	4
Sturt Meadows	3	1	..	..			

The Observatory, Perth, Dec. 6, 1900.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF
NOVEMBER, 1900.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of																
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomoloes.	Pines.	All other fruits.	
FREMANTLE	11	20	3067	3067	..	..	1	3067	..	311	113	69	..	1427	..	1108	65	..	..	..	..	..	6	10	23
ALBANY	4	4	168	165	3	..	..	167	..	..	5	9	..	29	..	87	..	..	..	3	1	..	..	..	31
GERALDTON	2	5	55	55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	..	..	..
HAMELIN .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BONBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	17	29	3230	3237	3	..	1	3234	..	311	113	78	..	1456	..	1195	65	..	..	3	1	61	10	54	..

DEPARTMENT OF AGRICULTURE,

10th December, 1900.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF NOVEMBER, 1900.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.																
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vin Cuttings.	All Other Trees.	
FREMANTLE ..	3	3	170	3	170	..	..	3	170	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ALBANY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMMILL ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	3	3	170	3	170	3	170

DEPARTMENT OF AGRICULTURE,

10th December, 1900.

I. A. R. I. 75.

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